COAL AGE

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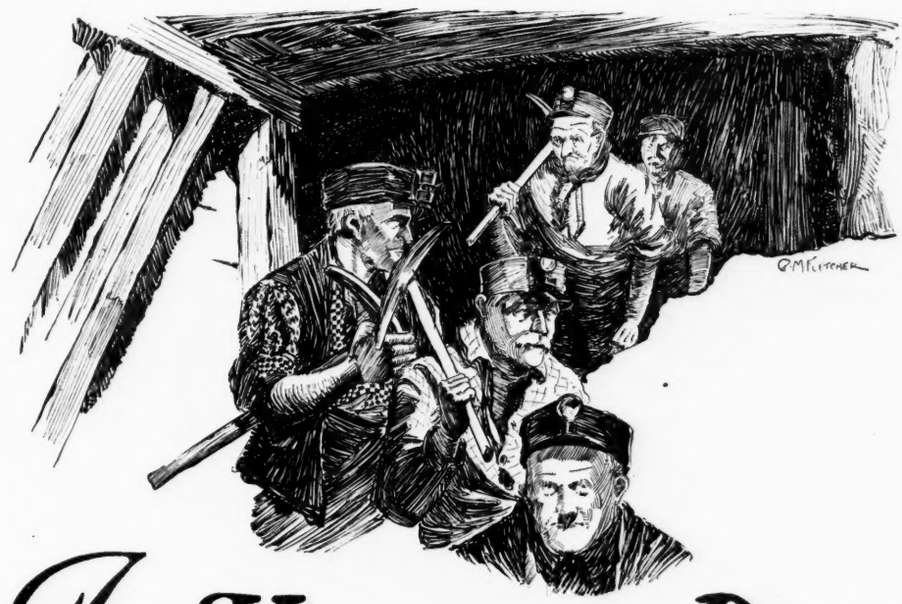


The Heroes of the Pick

By Rufus T. Strohm

Written Expressly for COAL AGE

THEY had drawn away from the heavy toil
And dropped the drill and the miner's lamp;
They had grown unused to the smell of oil,
The powder reek and the sultry damp;
For there wasn't one but had passed his prime,
And work seemed more than their frames could bear,
So they swapped the sweat and the sooty grime
For the soothing pipe and the easy chair.

BUT the war came on, with its vast demands
For guns and shells and the men to fight,
And the mines were stripped of the youthful hands
That took up arms in the cause of Right;
Then the old graybeards who had quit the race
And stood aside for the younger men
Traveled back once more to the working face
And bent to their old-time tasks again.

FOR the country's need in the dismal strait
Was great as the skillful hands were few,
So they scorned to load, and they would not wait
But did the thing that they best could do;
And their wrinkled faces were freshly scarred
By falling coal and by flying chips,
And their twisted fingers grew rough and hard
From clutching long on the shovel grips.

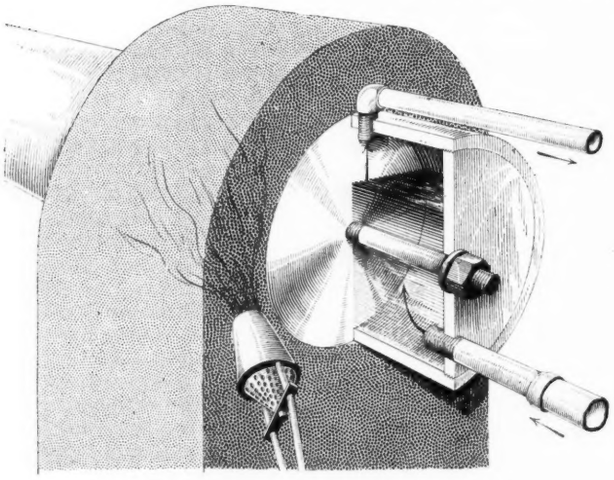
THEN here's to the veterans of the mine,
Whom age nor weakness could hold in thrall,
But who manned the gaps in the working line
When youth had answered the bugle call;
For they give the help that the nation craves
And show the spirit that wins the day,
And they put to shame all the slacker knaves
Who dare to do any less then they.

IDEAS AND SUGGESTIONS

Removing a Tight Crankpin

BY J. A. LUCAS
Ozone Park, N. Y.

Many difficulties arise in removing a crankpin for repairing. To do this tedious job without damaging the pin I hit upon the idea shown in the accompanying illustration. A piece of pipe of the diameter of the pin was internally threaded on one end and plugged with a



HOW THE CRANKPIN WAS REMOVED

plate, thus forming a container, which was held against the end of the pin by means of a bolt. A water inlet pipe was threaded into the bottom and an outlet at the top. While the crank arm was heated with a torch, water was circulated in the container, the circulating water keeping the pin cool. Upon heating the crank arm or disk, it expanded and the pin was then easily removed.

Slush Line Joints

Portions of anthracite mine workings for many years have been filled with the fine coal dirt and pulverized slate and rock resulting from preparation of coal in breakers. However, now and then a progressive colliery official will work out some modification of old methods which will simplify matters and save money. This was illustrated by a simple expedient adopted by the Lehigh Valley Coal Co. and noticed in operation at its Dorrance colliery, within the city limits of Wilkes-Barre, Pennsylvania.

For years the ordinary screw joint has been used on flush lines. On a long line many connections are necessary, and difficulty has often been experienced in unscrewing joints which rusted tight. Many times joints have had to be cut with a "diamond point" tool in disconnecting pipes when changing lines. This method took time and wasted material. To overcome this obstacle a simple and effective joint was devised which has given satisfaction in operation.

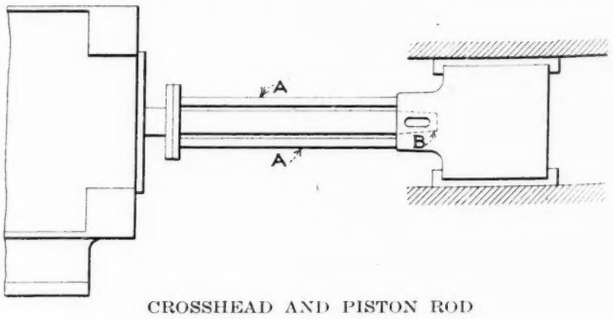
At the Dorrance colliery the slush material is carried into the mines down an 800-ft. borehole through a 6-in. pipe line. From the bottom of this borehole the slush is carried a considerable distance along gangways before reaching the workings to be filled. It is on this latter line that the couplings in question are made. On straight lines of 6-in. pipe, couplings consist of pieces of 7-in. pipe 20 in. long. The joint is made by driving wooden wedges in between the 7-in. coupling and the 6-in. pipe around both ends of the coupling. There is a space of about ¾ in. between the 6- and 7-in. pipe. This joint is readily made in about ten minutes.

When this kind of a joint is made, the 6-in. pipe has blank ends, the thread being omitted. A blank-end pipe lasts longer than a threaded pipe, which is weakened by the threads. To loosen this pipe coupling the wedges are knocked out and then the 7-in. sleeve is driven back with a sledge. These couplings will stand any pressure likely to be met with in practice, and they will last until a change of pipe is necessary under usual conditions. Turns in a pipe line can be made, a line bending 7 ft. in 20 ft. of length. In this case an 8-in. coupling is used in making a joint. *Coal Age* is indebted to the courtesy of H. Price, the inside foreman at the Dorrance colliery, for information in regard to the slush joint described.

Crosshead Removed by Heating

BY A. J. CAHEN
Brooklyn, N. Y.

Some time ago a 500-hp. engine of the Corliss type was to be dismantled, and it was found impossible to remove the crosshead from the piston rod by any of the customary methods. The end of the rod *B* was a taper fit in the head, as indicated in the accompanying draw-



CROSSHEAD AND PISTON ROD

ing. After several schemes were tried and abandoned, I decided to utilize the principle of expansion and contraction of metals under the action of heat and cold, and arranged as follows to get the head off the rod.

In the drawing the rod and crosshead are shown with the rod projecting its maximum distance from the cylinder, which gave a measurement between the end of the crosshead and the face of the stuffing box gland of about 6 ft. A gasoline torch was applied near the

middle of the length of the rod, where a sheet-steel hood had been arranged. Although various observers had prophesied that it would be impossible to heat the rod sufficiently in this way to cause it to expand appreciably, nevertheless, after application of heat for some little time, the length of the rod had increased as much as was required for the purpose.

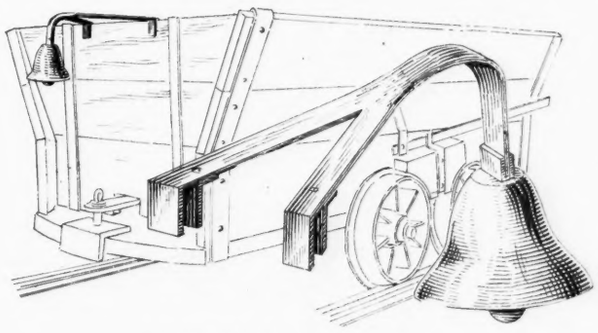
After the rod was heated a measurement was taken between the face of the gland (which was backed up against the stuffing box after the packing was removed) and the inner end of the crosshead. According to this measurement a pair of steel shafts were squared off slightly longer than it was supposed they would be required. These were placed as at *AA*, on opposite sides of the piston rod between the crosshead and the stuffing box, where they were supported upon a suitable frame. Cold water was then poured on the hot piston rod and the instant it commenced to shrink it pulled the crosshead snug against the ends of the shafts and a moment later the crosshead was forced free.

Alarm Bell on Mine Car

By Matthew Stafford
Chase River, Vancouver, B. C.

In many mines the main haulage road is also used as the traveling way on account of it's being the intake and it is desirable to allow the men to travel in fresh air. There are, however, other local causes. Traveling on the haulage roads—especially when the trip is running—involves an element of danger that every miner realizes. This is enhanced when the road is used for main and tail haulage, and it is for this special system that I wish to suggest an improvement that I think would be appreciated.

There are certain parts of these haulage roads where the trip is running the rollers and the drums make a noise, similar to that of a running or approaching trip. This causes the men and boys to run to the nearest manhole or squeeze themselves against the side. After a short period of waiting they step out thinking they have been fooled, probably only to get the scare of their



DETAILS OF ALARM BELL

lives with the real article in the shape of the trip suddenly coming upon them. We all know the safest plan is to strictly prevent men from traveling on the road while the trip is running, but sometimes this plan is evaded.

What I would like to suggest would be the placing of a good sized bell attached to a spring and made to fit on the front car of the trip—either full or empty—by two properly shaped hooks to prevent its toppling over. The top of the bell and the spring should be no higher than the top of the car. I think this would be in line with the safety movement that is doing much good in the prevention of accidents.

Duty and Destiny

IT is not every man who realizes that as he goes his way his destiny accompanies him. And the man who has learned that duty and destiny are inextricably woven together is as unusual as he is fortunate.

There is getting to be small place in the world today for the man who cannot see his plain duty and recognize the fact that his own and his country's destiny depend on his performance of that duty. It is a fine thing that hundreds of thousands of coal miners are learning to express the product of their labor—not in terms of net tons, but in terms of guns, shells and ships. For a miner to know that four shovelfuls of coal mean a 3-in. shell for his brother or son to shoot at the Hun is the best possible way for him to see his duty and the destiny of his family, self and country. And when all the miners in America begin to dig coal on the basis of a 3-in. shell for every four shovelfuls of coal, it won't be long 'till the boys "over there" will have finished what they set out to do.

WE have a national duty, too, that is growing clearer and plainer to all — America must use her forces to the limit to crush German kultur as quickly as possible and thus make life, rather than death, the destiny of millions of men; for the best opinions are that a long-drawn out war would suit the German plans better than anything else—for the German believes that war is the chief business of man.

Where is the man who cannot see his individual duty in the face of a national duty like this? If there is such a man in the mining industry, he can only fail to see his duty by looking through the glasses of ignorance or blind prejudice. He will do well to remember that there will be a sorry destiny for the man in America who cannot see his duty in this day and time.

DUTY is a sublime word because it means work and service. there are many ways of gaging the size of a man. You may find his intelligence by examining his brain. Better still, you may find the kind of man he is by looking into his heart. But nowadays you had better look up and down his backbone to see if he means to do his full duty to his country and its allies, by aiding them in working out the destinies of free men in the world.

To the man who is so fortunate as to be a skilled coal miner, a motto is offered for the duration of the war:

I Am a Coal Miner.
I Can Produce 300 *3-Inch Shells a Day.*
I Ought to Produce 1800 *Such Shells a Week.*
I Must Do All I Can to Crush the Hun.
I Will Do My Duty.

THE coal miner who lives up to this will never need to have a fear about his destiny. It will take care of itself.

COAL MINERS OF AMERICA—Your wills are your own, and your wills are your masters. The destiny of thousands of good men at the front is in your hands. It is up to you to make answer.

Simpson Creek Coal Co.'s Tipples

By R. G. READ
Chicago, Ill.

SYNOPSIS—*Many novel features are embodied in the design of these tipples. The coal coming down the mountain side instead of consuming power generates it. Falls, and consequent degradation of coal, are carefully avoided so far as possible throughout the entire design.*

THE fundamental consideration governing the design of tipples Nos. 2 and 3 of the Simpson Creek Coal Co., at Galloway, W. Va., was the saving of power and labor for operation. Contrary to the general practice of using a retarding or drag conveyor where the coal is to be delivered for loading to a lower level than the mine, a conveyor of the apron type was used. By this arrangement the potential energy in the coal due to the action of gravity was utilized instead of being wasted, together with the additional power required to actually drag the coal down the hill. The topographical conditions were particularly favorable to the working out of this idea in these installations.

Fig. 2 shows the general arrangement of the No. 3 tipple, the No. 2 being substantially the same except that the conveyor is shorter and on a uniform pitch. The trip of 80 cars, containing 2¼ net tons of coal each, is delivered to the tipple by a chain car haul. A Phillips crossover dump delivers the coal to a hopper, from which it is fed by means of a reciprocating feeder to the apron conveyor, which discharges it onto the gravity screens.

The empty cars are kicked back onto a car-haul tripmaker which elevates them to the level of the loaded track and pushes all preceding cars out onto the empty track, so that the trip is made up mechanically. The loaded car haul has an adjustable capacity of three to five cars per minute, and is so located with regard to the scales that each car comes to a stop while being weighed. The driving machinery is located in a concrete pit below the floor, an idler sprocket being used in order to gain headroom around the machinery. The reciprocating feeder is provided with an adjustable-stroke crank and an adjustable-speed motor. The discharge end of the feeder plate is perforated so as to allow the fine coal to drop through, providing a cushion for the lumps. This also makes a partial separation for picking on the conveyor when desired.

The conveyor is 48 in. wide, of the long-pitch apron type, mounted on two strands of bushed roller chain with inclosed-oiling, chilled-tread rollers. The drive is placed

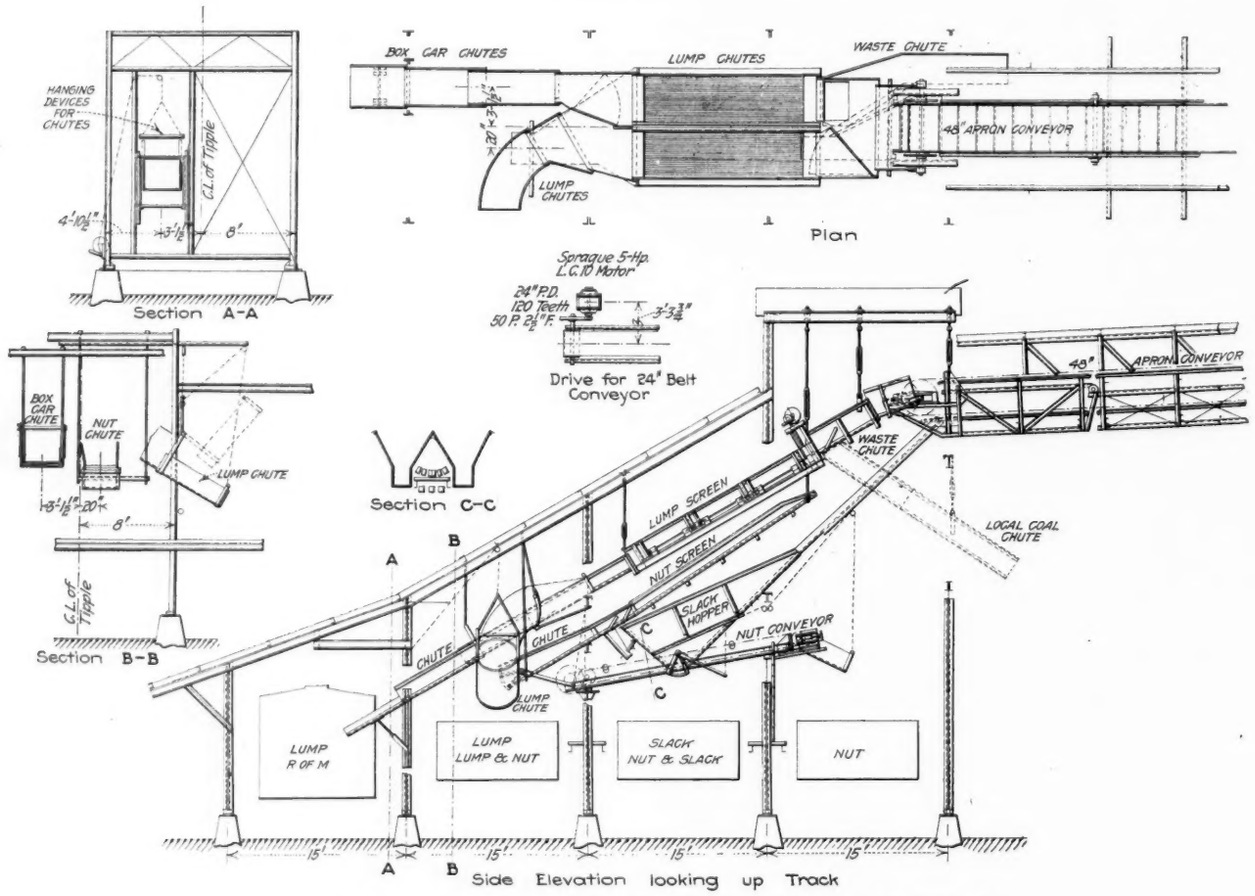


FIG. 1. ARRANGEMENT OF SCREENING EQUIPMENT IN THE TIPPLES

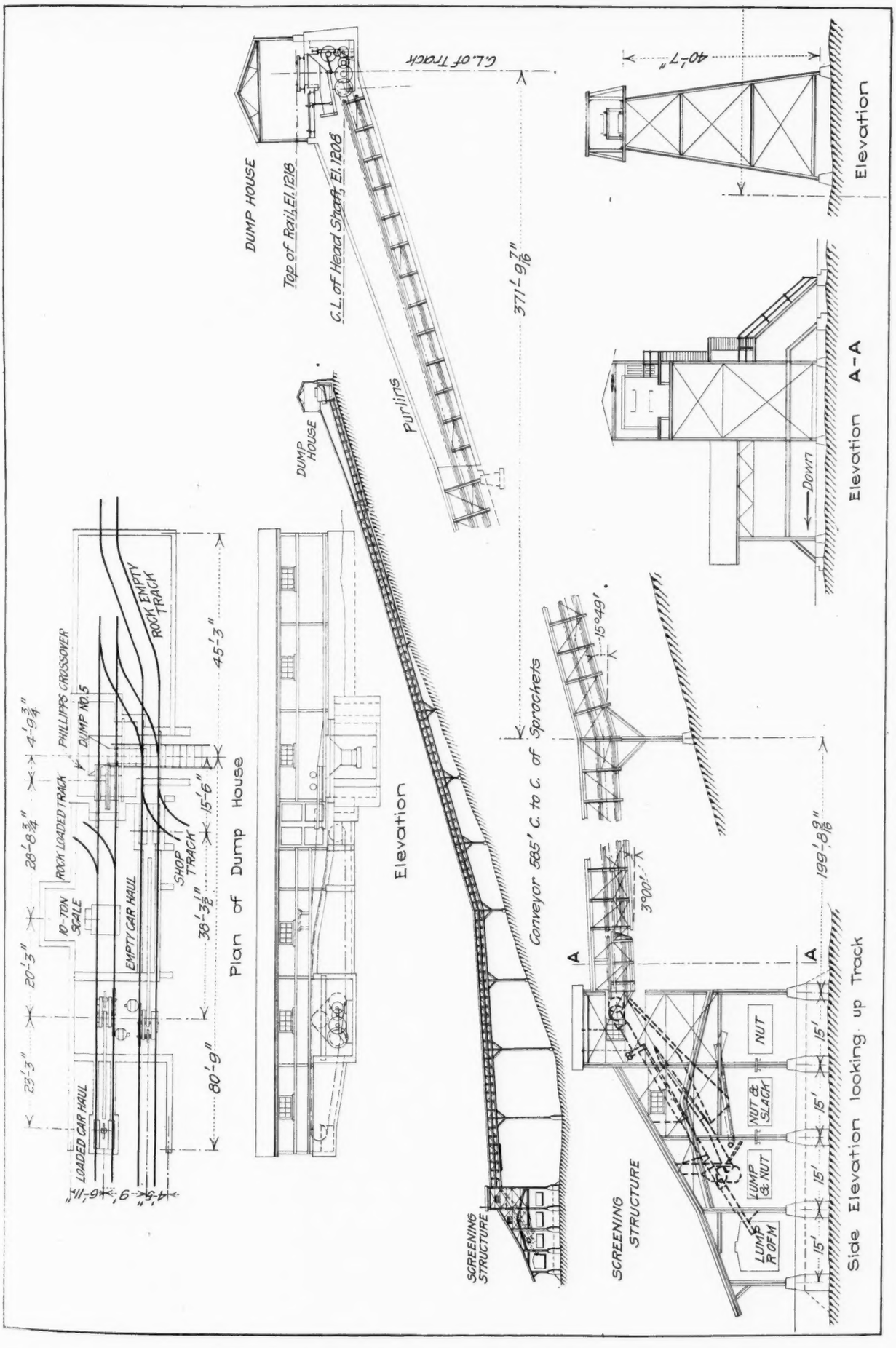


FIG. 2. GENERAL ARRANGEMENT OF NO. 3 TIPPLE, DUMP HOUSE AND CONVEYOR LINE

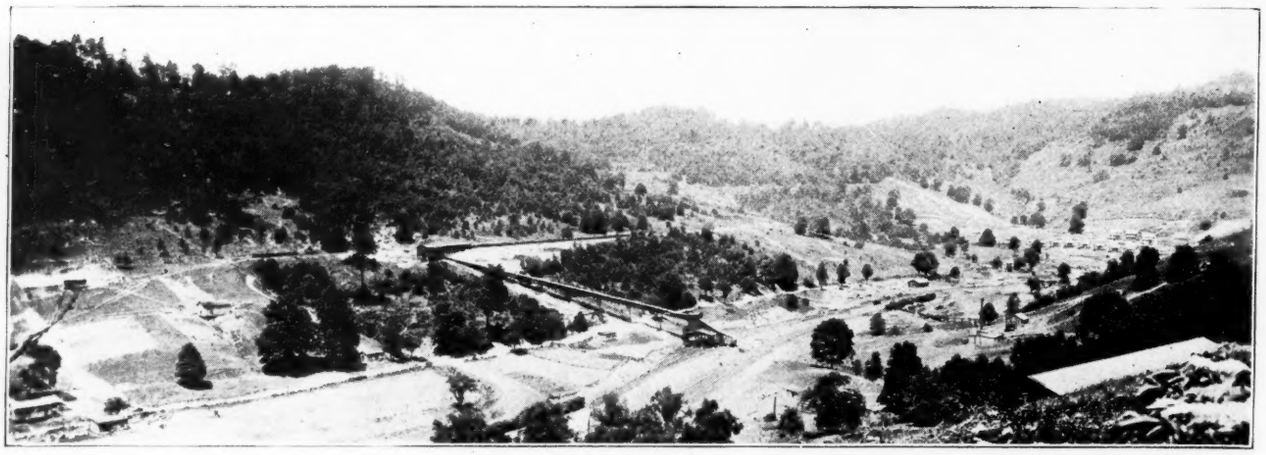


FIG. 3. DISTANT VIEW OF NO. 2 TIPPLE, DUMP HOUSE AND CONVEYOR LINE

at the head end, all machinery being mounted on a self-contained steel frame on concrete foundation. The take-up is located at the lower end and the pitch of the conveyor on the flatter portion is sufficient to run the line when loaded, so that no power is applied through the take-up shaft.

A 20-hp. adjustable-speed motor is geared direct to the drive shaft. This motor starts the conveyor empty, and as the conveyor becomes loaded the power taken becomes less and less until the motor is finally run as a generator with an output of 30 hp., which is returned to the line. A magnetic brake attached to the motor holds the load when the motor is stopped. The control is of the remote push-button type with magnetic acceleration. A push-button station for starting and stopping is operated by the dumper, and a stop and safety (no start) station is located on the trimmer's platform in the tipple.

The discharge end of the conveyor is carried on a pivoted frame so that the screens can be adjusted without increasing the drop of the coal. The discharge chute is connected to the take-up shaft and moves with it, thus maintaining the proper relation between the two. The speed of the conveyor may readily be adjusted to travel from 50 to 90 ft. per minute.

Fig. 1 shows the arrangement of the screening equipment. Contrary to accepted practice, the point of discharge to the railroad car was considered as the basic point rather than the discharge onto the screens. The entire screening equipment, including the discharge of the conveyor, is adjustable, so that any reasonable pitch can be secured without increase in breakage. The point of discharge to the car is also adjustable within reasonable limits.

The principal requirements in this installation are the loading of large quantities of thoroughly screened ¾-in. lump and run-of-mine in open and box cars, and the loading of slack in open cars. It is also necessary at times to load nut coal in open cars. It will be noted that the design is such as to accomplish the main purposes with the minimum of uncontrolled travel of the coal in the chutes. The usual position of the nut and slack tracks is reversed, and the nut coal is conveyed to avoid increasing the height of the discharge of the conveyor which would be necessary in order to make a gravity distribution of the nut. Special attention was given to the design of the main loading chute, so as to make the loading apron sufficiently easy of operation to insure its being used. This means the minimizing of the drop of the coal into the car.

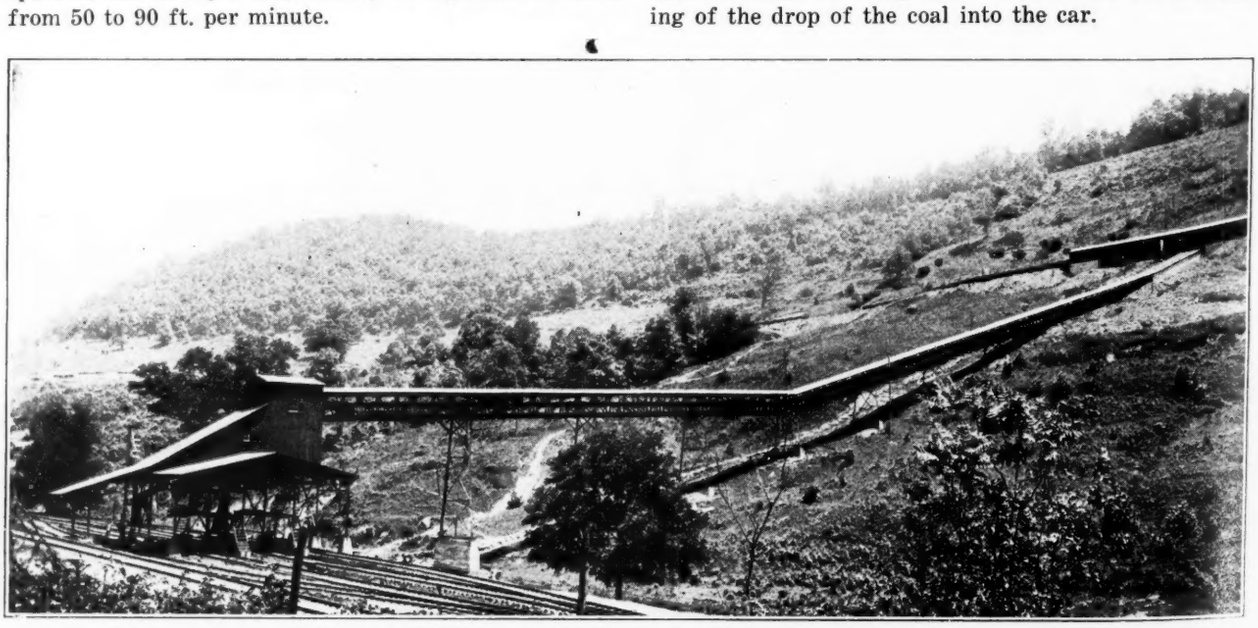


FIG. 4. GENERAL VIEW OF NO. 3 TIPPLE AND CONVEYOR

The veil plates on the lump screens are electrically operated, a separate motor being used for each of the two sets. These are made up of three sections each. Each screen has a surface of 4 x 16 ft., and by using different combinations of the veil sections it is possible to adjust the screening to the actual requirements for inspection of the coal. The design of the veils is such as to permit of their being lowered without the necessity of removing any small lumps which may be lodged between the screen bars.

The box-car loaders are of the pivoted truck type known as Model 3C Christy. These are particularly suited to the requirements of this installation. Domestic coal is taken care of by a steel tank in connection with the No. 2 tipple. Both tipples are of steel throughout, and the roofing and siding are of asbestos protected metal.

The control of the motors is of the remote type with magnetic acceleration operated by push button. Each motor is provided with a field rheostat for adjusting the speed. A 25 per cent. series winding is provided for

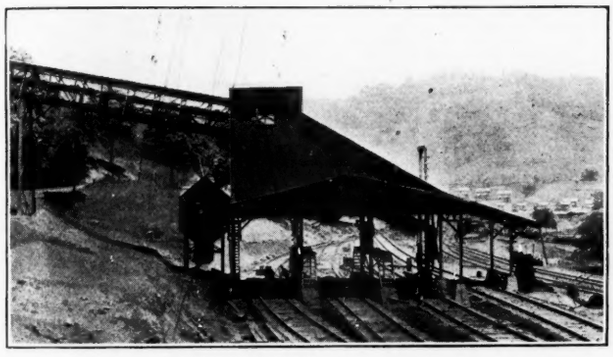


FIG. 5. NO. 2 TIPPLE AND DOMESTIC COAL TANK

starting. This is automatically cut out when the motor reaches full speed, after which it operates on straight shunt winding.

Fig. 4 is a general view of the No. 3 tipple. Fig. 5 shows the No. 2 screenhouse and domestic coal tank, while Fig. 3 presents a general view of the No. 2 tipple. Each tipple has a normal working capacity of 500 tons per hour, but a much larger output could be handled should necessity require.

The entire equipment was designed and furnished by the writer, and the conception is original. The construction work was carried out by Elkins Read. The Simpson Creek Coal Co. owns 3100 acres of the Pittsburgh seam, which is exceptionally thick and free from impurities. J. W. Galloway is president of this company, J. E. McGowan, secretary and treasurer, and David Williamson, vice president and general manager.

A New Mine Mule

A new wrinkle in the solution of transportation problems for small mines, quarries, sand pits and operations of such character is worthy of attention, and more especially at this time, when the nation-wide cry is for more coal. At a time when the labor market is drained the only solution in answer to such a cry is by the greatest possible adaptation of all mechanical means for the speeding up of production.

A step in this direction, the importance of which is apparent upon short consideration, is the recently perfected Leathers mine motor now being built by the L. A. Leathers Co., of Brookville, Penn. About a year ago this concern built the first motor as an experiment, in an effort to eliminate the use of mules on a long outside haul at a mine too small to warrant the installation of a power plant or the purchase of the more expensive type of mine locomotives. The experimental motor was built by mounting a Ford chassis on a substantial white-oak truck fitted with flanged wheels for use on the mine track. Several features have been added to eliminate some of the inherent automobile characteristics not suitable for mine haulage.

After a year of continuous service the motor is giving most excellent satisfaction, and the mine tonnage has been tripled, being raised from 50 to 150 tons per day. For the small mine operator, so many of whom have commenced operation during the past two years, this haulage innovation should prove a godsend. It not only enables an increased production, but at the same time eliminates mules on the long hauls by the substitution of a motor obtainable at a low first cost and which can be operated at all times on outside haulage as well as in any mine entries in which the ventilation is suitably arranged.

Best Weather-Resistant Paint

The best paint to resist weather is one made from pure linseed oil combined with pigments of permanent color and high protective quality. Linseed oil cannot be adulterated and yield best results in a paint; thinners and dryers are not, however, adulterants. The popular belief that white lead is the best procurable body for a paint is rapidly being disproved by the employment of other and better pigments or mixtures of pigments. Science has made possible improvements in paint making just as it has in the other branches of human endeavor.

"Slacker Boards" in West Virginia

In an effort to stimulate coal production, what are known as "slacker boards" have been erected at each of the 15 operations of the New River Co. in Kanawha and Raleigh Counties. The slacker board is a large blackboard appropriately lettered so that the result of the day's work can be filled in the blank spaces and read at a glance. Among other things the board gives the allotted tonnage, tonnage produced for the day, number of men working, number off, hours worked, names of men not working, etc. These boards will be conveniently placed near the company offices where the men can readily see them and see what they have accomplished for the day.

Another innovation of the New River Co. is the daily posting of Associated Press bulletins at each of the operations giving the latest war news each day. In connection with the war it may be interesting to state that to manufacture ammunition for one hour's bombardment on a one-mile front requires 7000 tons of coal. Thus it will be seen why every effort is being made to speed up the production of coal and why the war department has ordered that no more miners be enlisted.

Large Underground Synchronous Substation

By R. P. HINES
Fairmont, W. Va.

SYNOPSIS—*An increasing load growing ever more remote rendered the installation of a transforming and converting station underground advisable. This has now been in use for many years with marked advantage in operation and has given entire satisfaction.*

IN VIEW of the discussion, pro and con, on the subject of underground substations, which took place in the columns of *Coal Age* some months ago, it was thought that a description of such an installation that has proved its worth and reliability by years of continuous service, together with certain other features connected with its development, would perhaps prove of great interest to many readers. It is with this hope in mind that this article has been prepared.

The coal-mining development where this substation is installed is located in the bituminous coal field of Somerset County, Pennsylvania. The coal being mined is what is locally known as the C Prime seam. The company operating this development has various other mines in the same region, and a central steam-electric generating station has been installed, from which power is transmitted to the company's operations in the vicinity.

The particular mine where the substation under discussion is installed is located about four miles from this central generating plant, and power was originally transmitted to it at a pressure of 6600 volts. In the initial installation and development a substation consisting of two 150-kw., 275-volt, direct-current synchronous converters, with necessary transformers, switchboard and accessories, were installed in a brick building located about 200 ft. from the pit mouth.

This first substation was installed about 1907 and served the needs admirably for several years, but finally development in the mine had progressed so far that the main workings and much of the electric locomotive haulage were more than a mile away from the outside. Additional copper feeder had been installed from the substation, from time to time, until the point had been reached where the bettering of inside voltage conditions was slight in proportion to the expense for the copper required, and the load on the substation and transmission line had gradually increased to such a value that it was necessary to provide additional capacity in both.

After carefully considering the problem, it was decided to move the substation to the inside of the mine, to a location about a mile from the pit mouth, thus placing it centrally with respect to the area to be supplied.

In order to get additional carrying capacity in the transmission line, it was decided to raise the transmission voltage from 6600 to 11,430. This was easily accomplished by merely reconnecting the power transformers at the generating station from delta to grounded Y on the high-tension winding. Of course, all the transformers receiving power from this line had also to be reconnected on the high-tension side from delta to grounded Y.

To provide the additional substation capacity, and also to prevent shutting down the mining operations while the substation equipment outside was being dismantled, moved inside of the mine and reërected, a new 150-kw. synchronous converter equipment, complete with requisite transformers and switchboard, was purchased. The transmission line was extended overland about a mile from its former terminus, to a point directly above the new location for the substation inside of the mine, and a borehole drilled down into the mine, piercing the substation room.

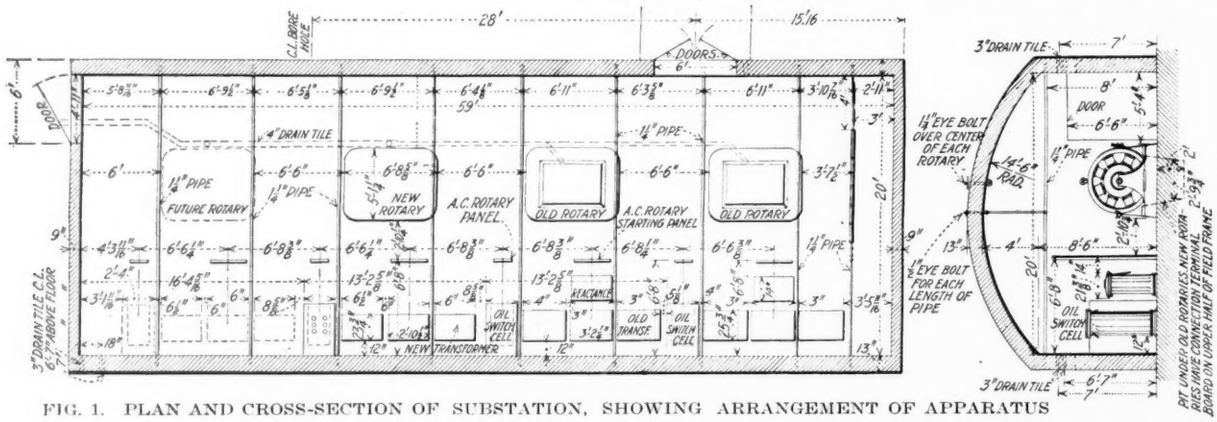


FIG. 1. PLAN AND CROSS-SECTION OF SUBSTATION, SHOWING ARRANGEMENT OF APPARATUS

By shooting out the rock, sufficient space was provided in which to construct the room for the substation equipment. This substation room is 20 ft. wide, 59 ft. long, and has a brick arched roof 13 in. thick on a radius of 14½ ft., giving a height of 8½ ft. at the walls and 12½ ft. at the center. The floor is of concrete, and the walls are of brick 13 in. thick. The walls and roof are thoroughly treated with a waterproofing compound. Sheet-steel doors are used at the entrances to the room.

The borehole is cased throughout its entire length with 5-in. iron casing, cemented in. This casing is extended above the ground level about five or six feet. This prevents flooding the borehole from surface water and places the cable clamp and cable end bells, or potheads,

high enough above the ground to prevent accidental damage. Suitable knife-blade disconnecting switches are provided on the transmission line at the borehole, and there is also installed an electrolytic lightning arrester. Power is taken from the overhead transmission line down to the substation at 11,430 volts, through a No. 2 American wire gage, three-conductor, varnished cambric, insulated, lead-cased, wire-armored, jute-and-asphalt-finished cable suspended in the borehole casing. This is approximately 275 ft. deep, and the whole weight of the cable is supported by the wire armor. This is fastened by a clamp designed for the purpose resting on the top of the borehole casing. End bells, or potheads, of the disconnecting type are used on each end of the cable.

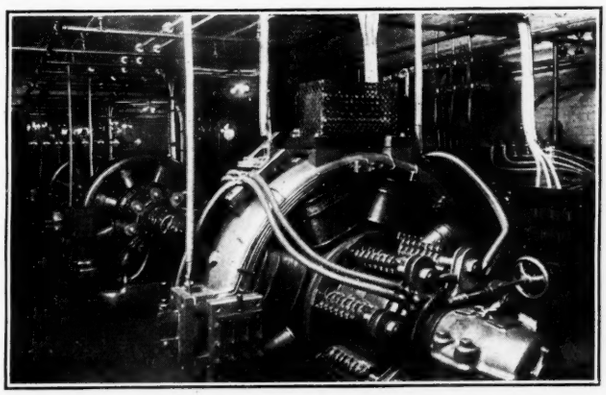


FIG. 2. INTERIOR VIEW OF SUBSTATION SHOWING PIPE CABLE SUPPORTS

The cable is taken into the substation room through the brick side wall, and connects to the high-tension bus which extends the length of the room, being carried on pipe framework, from which it is supported by petticoat-type porcelain insulators mounted on iron pins. The plan view of the room and the layout of the apparatus accompanying this article (see Fig. 1) will give a clear idea of the relative location of the different parts of the equipment.

The synchronous converters are six-phase, compound-wound, 900-r.p.m. machines, and for each converter three single-phase, 60-cycle, oil-insulated, self-cooled transformers connected in grounded Y three-phase on the high tension, and six-phase diametrical on the low tension, reduce the voltage from 11,430, at which the power is received, to 186, at which it is applied to the collector rings of the converter. With each set of three transformers there is used a separate external three-phase, oil-immersed reactance, for compounding the direct-current voltage of the converter, maintaining practically a flat compound of 275 volts from no load to full load.

The high-voltage oil circuit breakers have each pole in a separate oil tank, and are inclosed in brick cells with slate tops. They are provided with knife-blade disconnecting switches in the leads connecting them to the high-tension bus.

The direct-current panels are all grouped together at one end of the room, while the alternating-current rotary starting panel and the alternating-current rotary panel for each machine are mounted together and located conveniently to the machine which they control.

It will be seen from the illustrations (Figs. 2, 3 and 4) that all the wiring is carried overhead on a pipe framework, to which suitable porcelain insulators and fittings are attached. The main cross pipes of this framework run from one side wall to the other and are supported at a central point by a hanger from the arched roof. The overhead wiring is more accessible than that which

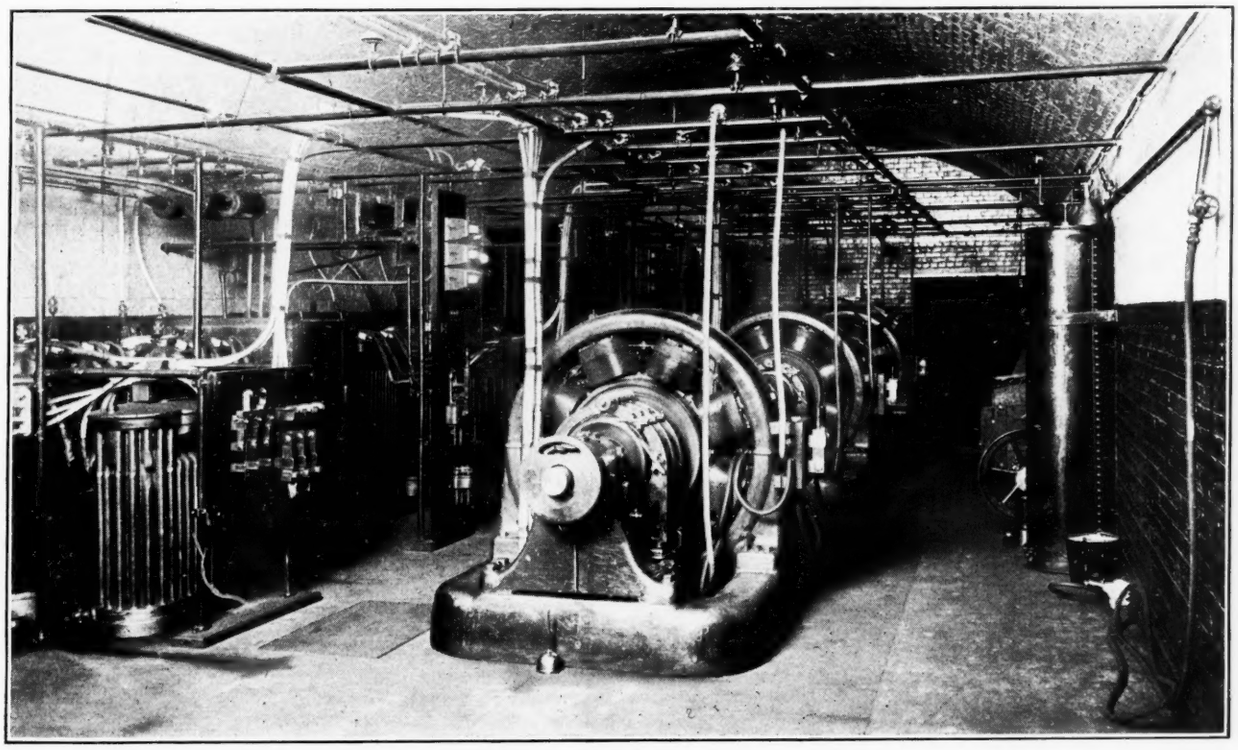


FIG. 3. VIEW IN SUBSTATION, SHOWING ROTARIES AND VERTICAL AIR RECEIVER

is carried in conduits in the floor, and it was thought less likely to give troube. Furthermore, it will not be submerged by water in the room, as that in conduit might be. The new machine was arranged specially with the terminal blocks for the leads on top of the field frame, thus making the usual pit under the machine unnecessary, and at the same time rendering it more adapted to the overhead scheme of wiring.

A small motor-driven air compressor of about 6½ cu.ft. capacity, with an air receiver, pressure gage, pop safety valve, air piping and rubber air hose, is installed for the purpose of furnishing a bountiful supply of compressed air, to be used in thoroughly blowing out all the dirt, carbon and copper dust from the machines.

All the cables are insulated with varnished cambric. A large eye bolt is set in the roof over the center of each machine for the attachment of a chain block when removing the armature, or doing other work of like nature.

In making the change from the outdoor to the inside location, the newly purchased machine and its equipment were first installed in the inside substation and put into operation, running in parallel with one of the machines in the outside substation, while the other machine and its equipment were dismantled, moved inside, reërected, and placed in operation. Then these two machines in the inside substation were operated in parallel, while the remaining old machine outside was taken down, moved inside and set up there. The whole change was made without interruption to the power supply to the mine.

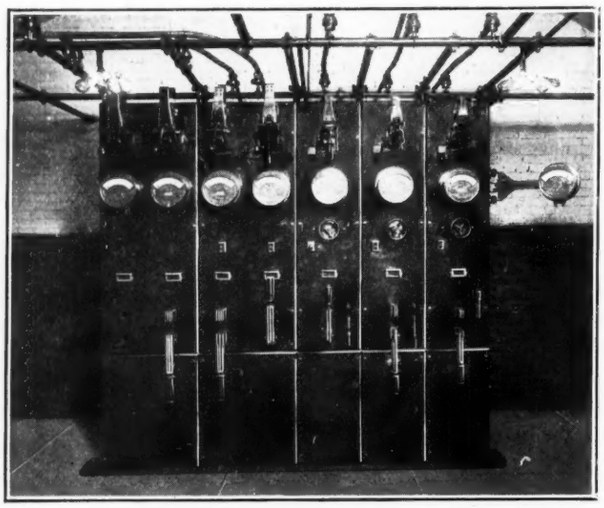


FIG. 4. SWITCHBOARD AT END OF SUBSTATION

The inside substation now contains three machines, and there is space for a fourth. This, it is expected, will be installed some time in the future, when load conditions require it.

The inside substation has been in constant daily operation since December, 1911, or somewhat over 6½ years now. The marked improvement in the operation of all classes of electric machines inside since this station has been operating has resulted in considerably fewer burnouts from low voltage, and consequently a large decrease in the cost of upkeep and more output from mining machines, pumping units and locomotives. There have also been enjoyed all the many other benefits which these features bestow, as well as those which result from a power supply with normal voltage well maintained at all times. In all respects the substation's service, operating benefits and reliability have been most satisfactory during this period of years.

In passing, it may be interesting to call particular attention to the fact that the two old machines have been in continuous service about 11 years, and that all three units are perfectly standard commercial machines, having had no special treatment to make them more moisture proof than ordinary units. The substation room is well ventilated by the air from the mine fan, is dry at all times, and no temperatures above the ordinary normal have been experienced.

Legal Department

CONDUCT OF BUSINESS BY ADMINISTRATOR—The administrator of the estate of a deceased coal merchant has no power to continue the business as representative of the estate. (Maryland Court of Appeals, Willinger vs. German Bank of Baltimore City, 103 Atlantic Reporter, 433.)

LESSEE'S RIGHT TO USE MINE PASSAGEWAYS IN REMOVING COAL FROM ADJOINING LANDS—Under a general warranty deed to underlying coal, with the right of ingress and egress to and from the land proper for the purpose of mining and removing the coal, without express provisions as to the time for removal nor as to use of the passageways in removing other coal, the grantee became vested with ownership of the coal in fee, terminable only by exhaustion of the coal or abandonment of the grantee's rights. He is also entitled to utilize the space made by removing coal for the purpose of removing coal owned by him under adjacent lands. And while a tract that is in open workable condition is being mined, the fact that there may be a temporary suspension of operations therein will not deprive the mine owner of the right to use the driveways for transportation of other coal, where he is acting in good faith and mining in the customary manner. Nor is coal in the ribs of a mine forfeited because left for a time to support the surface, the owner of the land having waived the right of surface support. (Pennsylvania Supreme Court, Westerman vs. Pennsylvania Salt Manufacturing Co., 103 Atlantic Reporter, 539.)

APPORTIONING DELIVERIES UNDER CONTRACT FOR YEAR'S FUEL REQUIREMENTS—Plaintiff contracted to deliver defendant's entire requirement of coke for one year, estimated at 40,000 tons, for shipment in approximately equal monthly installments. In certain months deliveries fell materially below the average of 3333⅓ tons called for by the contract, and defendants demanded deliveries in excess of that average quantity. Plaintiff sued for the price of coal delivered but not paid for, and defendants counterclaimed for damages for failure on plaintiff's part to fill orders in excess of 3333⅓ tons in each of certain months. Held, that defendants were entitled to credit for losses sustained through plaintiff's failure to make deliveries up to the full average quantity of 3333⅓ tons for each month, but that there was no breach of contract in plaintiff's failure to make monthly deliveries in excess of that quantity. "Taking into consideration that each month's delivery was to be treated and considered as a separate and independent contract, we cannot agree with the construction placed upon the contract by the defendants that the plaintiff was required to anticipate and provide quantities greatly in excess of the approximate stipulated amount required to be delivered each month under the terms of the contract. In effect, the plaintiff would unexpectedly be called upon in any given month to furnish any quantity of coke only limited by the full running capacity of the plant of the consumer." (Pennsylvania Supreme Court, Poland Coal Co. vs. Rogers, 103 Atlantic Reporter, 559.)

Advantages of Storage-Battery Locomotives*

BY C. W. CHAPPELLE
Manager St. Louis office of the Ironton Engine Co.

THE use of the storage-battery locomotive in mines for gathering coal is a comparatively new application of one of the oldest pieces of electrical apparatus we have, as storage batteries, in one form or another, have been in use in this country for nearly thirty years; and while the storage-battery gathering locomotive has only been in general use for about four years, it has proved to be eminently satisfactory when used under the proper operating conditions.

Until the introduction of this machine there were about four general methods of gathering coal; namely, by mules, by cable-reel locomotives, by electric crabs and by straight trolley locomotives. As the purpose of this paper is to point out some of the advantages of storage-battery locomotives, it would probably be best to discuss briefly the other methods in the order mentioned.

The actual cost of mule haulage will, of course, vary with localities and mine conditions, but it has increased greatly during the past two years. In a great many mines where the coal is low it is usually necessary to cut out additional top or bottom, and sometimes both, to obtain the head room required for the mules. Again, the amount of coal that can be hauled by mules in low coal as against that in high coal is naturally less, owing to the difference in the size of the mules which can be used. In figuring upon the maintenance of mules in coal-mining work the main items of expense are first cost, feed and shoeing, veterinary, barn attendance and harness.

IMPORTANCE OF HOUSING, DRAINAGE AND VENTILATION

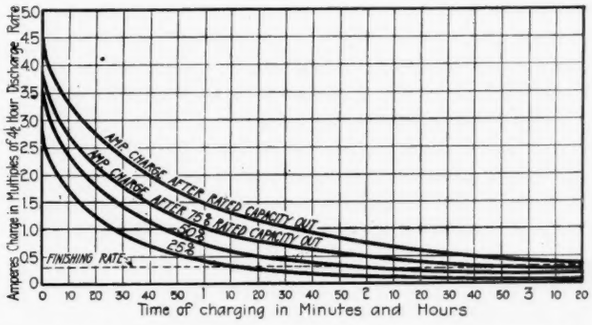
In addition to the items noted the question of proper housing, drainage and ventilation are important factors, as well as the transportation of food and refuse if the mules are kept underground. Stables for mules should be kept clean and well lighted, as good care means simply good insurance. A mule may last at this work anywhere from five to ten years, but again he may be killed by accident at any time, and the amount of work which he can do will always vary with his physical condition.

The cable-reel locomotive is an adaptation of the trolley locomotive for gathering purposes, by means of a more or less complicated motor-driven cable reel mounted upon it. In order to obtain the best results from a machine of this type the tracks in the rooms should be bonded. On account of the fact that this cable-reel mechanism is complicated and that the cable is always subject to excessive wear, accident and abuse, the upkeep of this type of machine is always high, although its first cost may be somewhat lower than that of a storage-battery machine; but on account of these points it cannot gather as much coal in a given amount of time.

The electric crab is a device built on the nature of an electric winch and is used for the purpose of pulling cars out of a room by means of a flexible rope or cable; it is generally used where the grades are so heavy that they can not be negotiated by either a locomotive or a mule.

The straight trolley locomotive is also used for gathering, but the method calls for installation of trolley wires and track bonding in the rooms. Also, on account of the necessity of constantly handling the trolley pole and because the trolley voltage in the rooms is usually low, due to excessive copper loss, it is much slower than the storage-battery locomotive.

The storage-battery locomotive realizes more of the ideal conditions in connection with the gathering of coal than any other machine which has been produced up to date. It eliminates the cost, installation, upkeep and damage of overhead wiring, as well as the expense of track bonding. It allows of increased speed in gathering, as well as the elimination of handling a trolley pole or cable. It combines the speed, power and dependability of the locomotive with the simplicity of mule haulage and means greatly increased production over all previous methods.



CHARGE CHARACTERISTICS OF STORAGE BATTERY

The curves show what may be accomplished in the way of charging at high rates of current at the beginning of the charge and tapering the charging rate off as the charge progresses. These results were obtained by charging a battery from a constant potential source, the voltage of which was equal to the number of cells in the battery multiplied by 2.3. Under this method, with the battery discharged when put on the circuit, one half of a complete charge would be put into the battery in one hour. Also, as the charge progresses, the current automatically tapers off so that the cells never gas or heat injuriously

The field or range of action of the storage-battery locomotive has not as yet been clearly decided or limited. It seemed at first as if it would be limited merely to gathering work, but in many instances it has been used to advantage in main-line haulage. This is true particularly in new propositions which are just being started and where the distances to be traveled are not too great, and also in situations where the grade is favorable to the loads to be hauled.

I do not believe, however, that the storage-battery locomotive will supersede the trolley machine for main haulage work in general, but rather that an intelligent combination of the two types will nearest approach the ideal condition; this condition, of course, means the greatest number of tons of coal transported during a working day for the least amount of money per ton.

*Paper read before the Peoria meeting of the Illinois Mining Institute, May 24, 1918.

The storage-battery locomotive does mean, however, more tons of coal gathered with the use of less men, less power, less upkeep and less all around trouble than by any other mechanical means.

There are two distinct types of storage-battery locomotives in general use. One is the straight storage machine, in which the size and capacity of the storage battery is relied upon to do a full day's work, and the other is the combination type in which the storage battery is oftentimes comparatively small and is simply used as an auxiliary source of power in a trolley machine; the motors in the machine are operated in series when working from the trolley and in parallel when working from the battery, the battery receiving some charge from the trolley through a resistance during the former period.

Naturally the heart of a storage-battery locomotive is the battery, and contrary to the general belief a storage battery is not a thing of mystery, neither is it a complicated piece of apparatus requiring highly skilled men to look after it. It is one of the oldest and simplest pieces of electrical apparatus that the electrical engineer has to deal with, and can be cared for by anyone who is willing to obey simple instructions. Like the mule, however, it needs food and drink, and it requires it regularly. The food is electricity applied in the form of amperes for a certain amount of time, and the drink is pure water; and unless the water is known to be pure it should be distilled to make sure. Storage batteries should not be overheated while being charged; such overheating is usually caused by charging at a higher current rate for a longer period of time than the instructions give.

The batteries in these locomotives are usually put in specially designed compartments, either in or on the locomotive frame; the cells are assembled in groups in extra-heavy wooden trays, and these trays are usually insulated, by some form of porcelain insulator, from the locomotive frame. The individual battery cells are so assembled in the trays that the flat of the plate is in the direction of motion of the locomotive, thus producing a "dashpot" effect in the jars and absorbing all hammer-blow effects against them.

Troubles Experienced in the Early Days of Locomotive Construction

In the early days of locomotive construction considerable trouble was experienced with the lead type of storage battery due to jar breakage. This has been practically eliminated by the use of a so-called "guaranteed compound" jar, which is really an extra-heavy walled jar with a lot of rubber in it. In the Edison type of battery the jar is of metal and jar breakage is therefore eliminated. Originally a spring suspension scheme for the batteries was tried to some extent, but as it was never very practical it did not come into extensive use. At present the general practice is to assemble the trays in the battery compartments as snugly as possible, leaving just enough clearance so that a tray may be lifted out when required. Practical experience has demonstrated that rigid battery compartments with trays assembled in this manner are best.

There are two distinct types of storage batteries used in this class of work; one being the lead-sulphuric acid type and the other the iron-nickel-alkaline type, better known as the "Edison."

The lead battery used for this purpose is what is known as the pasted-plate type, with the exception of the "ironclad exide," in which the active material, as the lead oxide is called, is inclosed in slotted hard rubber tubes to keep it from shedding. The solution, or electrolyte as it is called, in the lead battery is a mixture of sulphuric acid and water having a specific gravity of approximately 1280 deg. The working voltage range of a lead cell on discharge is from 2 to 1¼ volts. The life of the lead type of storage battery used in these machines will be approximately 18 months to 2½ years, depending upon their construction and the kind of care they receive.

Characteristics of the Alkaline Type of Battery

The alkaline type of battery, better known as the Edison battery, is composed of positive plates containing nickel hydrate in perforated steel tubes and negative plates containing iron oxide in rectangular tubes or pockets, the containers in both cases being nickel plated. This element or group of positive and negative plates is contained in a nickel-plated steel jar, and the solution or electrolyte is a mixture of caustic soda or potash having a specific gravity of about 1250 degrees.

The working voltage range of an Edison cell is from 1.4 volts to 1 volt, approximately. The life of this type of battery is estimated at five years. On account of the difference in the working voltage of the two types of battery it is necessary to use a greater number of cells of the Edison battery than the lead type.

The batteries on these locomotives are usually charged either through a suitable resistance direct from the 250-volt trolley circuit in the mine or they are charged by means of a separate motor-generator charging set, in which case the voltage of the generator can be properly proportioned to the battery. The motor-generator method of charging is by far the best for the battery, and is also the most efficient in regard to current consumption. It is, however, considerably higher in the matter of first cost.

I would state that I have tried in this paper to outline the storage-battery locomotive and its application in a general way only. I have not tried to go into comparisons of cost as against mule haulage, but for general purposes it is safe to assume that a four- to five-ton storage-battery locomotive will replace from three to four mules. Each installation is a problem by itself, and this problem readily can be solved by taking the following points into consideration: The number of cars to be hauled per day; the number of cars to be hauled per trip; weight of the empty cars; weight of the loaded cars; greatest distance locomotive will have to travel per trip; the grades the locomotive will have to encounter in making one trip or cycle, both with and against the load; general character of the track and mine cars. In this connection the round trip should be divided into parts having different characteristics, such as different weight of train and different grades to be encountered.

With the foregoing information a person will be able to go to the various builders of the machines and obtain a clear and concise idea as to what can be expected in the way of results.

Discussion on Mr. Chappelle's Paper

FOLLOWING the reading of the foregoing paper there was a most interesting discussion on the merits of the storage-battery locomotive as applied to the gathering of coal in mines. The special field of this type of motor was enlarged upon and information was desired as to the care which should be given this machine, both in charging and in operation. Possible battery troubles were also discussed. The haulage of powder by electric locomotives brought out some good points, and the application of the storage-battery type to this service was commented upon. Altogether it was an unusually good discussion and the principal points made by each of the speakers participating in the discussion are noted in the following pages.

IT was stated by C. W. Chappelle that it costs approximately one-half as much to gather coal by storage-battery locomotives as it does with mules; that the storage-battery locomotive has come into active use in coal mines during the last four years, and is therefore comparatively new as regards coal mining. This type of locomotive is not a universal panacea for all haulage problems, and it is not expected to supersede the trolley locomotive; but an intelligent combination of the two should produce the best results. In many instances storage-battery locomotives are installed where trolley motors should have been put in. An intelligent investigation should be made in each case to see whether the battery locomotive is suited to the work.

Continuing, Mr. Chappelle noted that a storage battery may be charged at a high current rate at the start, provided the current is tapered off, so as to prevent gassing and overheating of the battery. As to storage troubles, in the first stages of battery-locomotive design much difficulty was experienced with jar breakage, but this was largely eliminated by the use of heavier trays and jars, and by installing the cells so that the flat of the plate is in the direction of travel (the length of the plate across the track) of the locomotive, thus providing a dashpot effect in the jar.

In regard to progress made, it was stated that in the earlier types of battery locomotives the speed was rather slow, being around 2½ miles an hour. Modern machines operate at from four to six miles an hour when loaded and from six to ten miles an hour running light. A good point was made by Mr. Chappelle who suggested that the Institute appoint a committee to collect and tabulate data on the actual cost of the various methods of hauling and gathering coal, whereby an average cost could be arrived at. Up to the present time not many mines know what it is costing them, and no two mines have exactly parallel operating conditions. The answer to the ultimate problem in all engineering propositions usually resolves itself into dollars and cents.

A number of representatives of storage-battery companies were present and responded to requests for information. At this point, Taliaferro Milton, Chicago district engineer of the Electric Storage Battery Co., with general office and works at Philadelphia, Penn., remarked that the storage-battery locomotive has its own special application in coal mines and that great care should be taken to see that it was properly applied. In his opinion it would never entirely replace the trolley locomotive—both types have their own fields of application. The storage locomotive in a few instances has been misapplied, and in such cases its failure has not been due to any inherent defect of the locomotive or batteries, but nevertheless such failures have given this type a "black eye" at times.

Further, great care should be taken in analyzing the haulage conditions before the locomotives are purchased, to determine the proper battery capacity. A large percentage of troubles with storage-battery locomotives has been due in the past to the fact that not sufficient battery capacity was provided for in the initial installation and no provision made for substituting a larger battery. From the original survey it is a simple engineering problem to calculate the required capacity in kilowatt-hours necessary to do the work in hand. This capacity having been determined, T. Milton would recommend that a storage battery having capacity considerably in excess of the calculated quantity be installed. In fact, he would recommend that the calculated requirements in kilowatt-hours be used as a guide to determine the minimum battery which should be used, and that the actual battery adopted should be the largest one which can be installed on the locomotive within the limits of the available space and weight requirements, providing this larger battery does not exceed double the calculated capacity requirements.

Continuing, he stated that the locomotive manufacturers must protect themselves in selling battery locomotives by specifying what the locomotive will do under definite, specific conditions of tonnage, length of haul, grades, working hours and other duty conditions. The locomotive may be sold under these definite specifications and live up to them on trial runs. Later on the conditions in the mine may be entirely changed and the work required of the locomotive will be so increased that it may be found that the battery on the locomotive is not of sufficient capacity to do a day's work. While this is no fault of the locomotive or battery, and while the manufacturer is protected by the working specifications, yet the operators are dissatisfied because the locomotives cannot meet the excessive requirements. If, therefore, a liberal factor of safety is used in determining the proper battery capacity, this condition will probably never arise. The money expended in this additional capacity is not wasted—it is a real investment. Even if this excess capacity is never taken out of the battery during any one day, the battery, because it is not worked up to its full capacity, will have an increased life; therefore, while the original investment is increased on account of the excess battery capacity, the maintenance is reduced. The excess investment is therefore returned to the purchaser in longer life of the battery. Simultaneously, the excess capacity acts as an extra insurance and has a real value to the operator.

Mr. Milton lays particular stress on the care and operation of the batteries on the locomotives, saying that there is no such thing as a "foolproof" battery—batteries require systematic attention. The instructions given by the battery manufacturers are simple and any mine employee who has common sense and who can be relied upon to obey orders and follow instructions can, in a short time, be converted into a good battery operator. The actual time spent in the care of the battery is little if the attention be systematic and in accordance with the instructions.

The point was brought up that the determining factor in selecting storage-battery locomotives for operation in coal mines is cost per ton of coal handled. While this question is largely an economic one, and while any one would install battery locomotives if it was proved that the cost per ton of coal handled would be reduced by the use of such locomotives, yet there are cases where the storage locomotives will be used even though the cost per ton of coal handled is increased by the use of this type. There are cases where it is necessary to use locomotives in order to get the required tonnage. The Electric Storage Battery Co. maintains a staff of competent engineers who visit the mines from time to time to inspect the batteries and to coach the operators in the proper handling of them. If the operators will take advantage of the services thus offered, the benefits to the manufacturers and operators will be mutual.

Mr. Bowers, of the Edison Storage Battery Co., of Orange, N. J., spoke of the disappointment expressed in the work accomplished by the battery loco-

motive in six months or a year. The work might be increased from 50 to 100 per cent. over that for which the locomotive was bought, and then the motor might be condemned because it would not respond. It was advised that in the original installation the demand be figured out and then the capacity of the locomotive be increased from 25 to 50 per cent. Also in the care of a locomotive—the services of an expert are not required—any man of intelligence who will follow a manufacturer's instructions will do. The storage-battery type is becoming so well known that a special operator is not necessary. In the early days it was necessary, but not now.

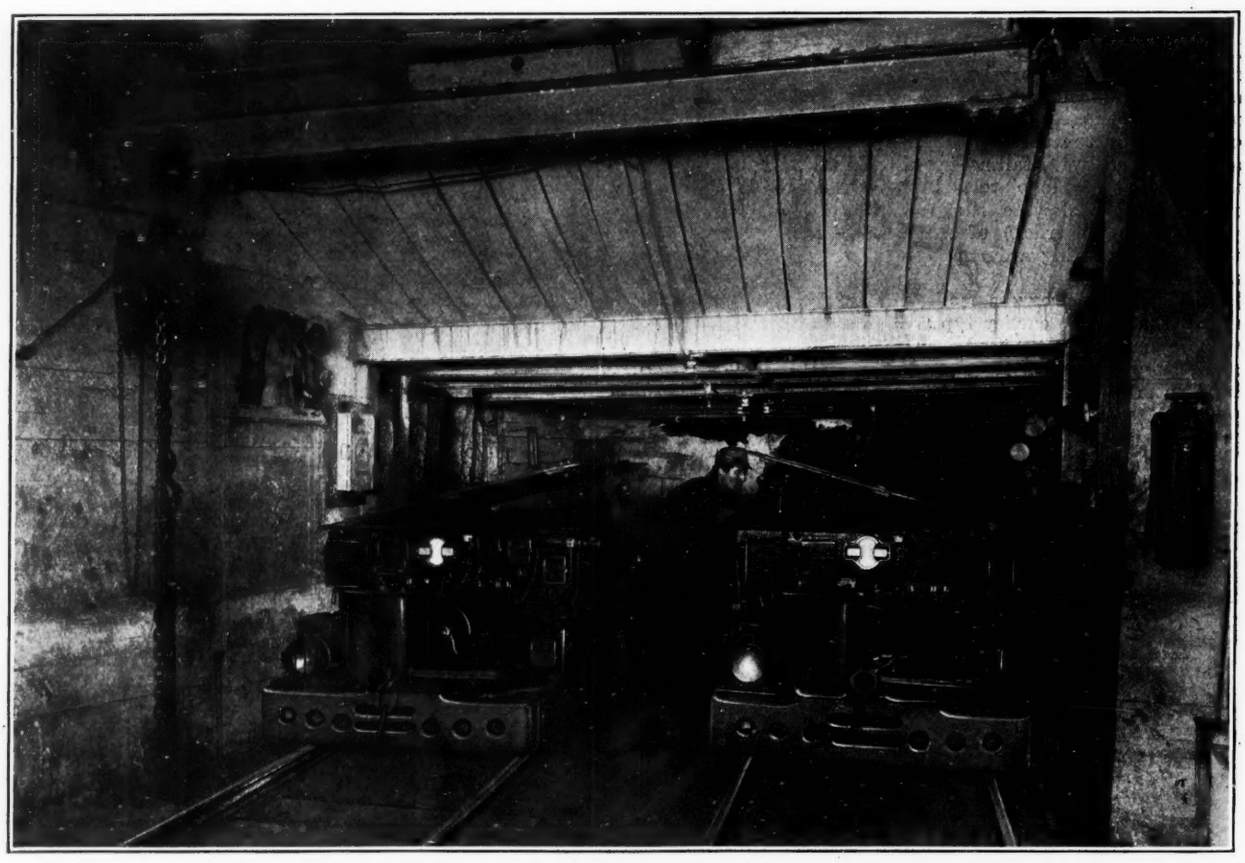
In replying to inquiries as to trouble encountered in the operation of storage-battery locomotives, T. Milton stated that the chief trouble was due to too small battery capacity, as previously noted. Too much emphasis could not be attached to this feature of locomotive design; also a battery should receive systematic attention and care. The regular instruction book issued by the Electric Storage Battery Co. gives some good ideas in this connection, but the main points, however, are brought out on the metal plate the company attaches to the battery box on the outside of the locomotive. The points brought out on this nameplate are the fundamentally important ones to which special attention should be paid.

Prominent among all instructions are suggestions about charging batteries. The motor-generator set is better suited for charging storage batteries than is the trolley current, for the following reasons:

The battery usually consists of 48 cells, and to completely charge this battery requires from 110 to 125 volts. The trolley voltage is usually 250 volts, so that in order to charge the battery direct from the trolley it is necessary to put in a rheostat to reduce the voltage at the battery terminals to 125 volts. It is thus seen that if the full 250 volts are maintained on the trolley there will be as much energy wasted in the charging rheostat as is stored in the battery. Aside from the wastefulness of this method of charging direct from the trolley, the trolley voltage varies considerably so that it is difficult to determine beforehand just how much resistance is required in the rheostat to produce the proper current for charging the battery in a specified time. By the use of a motor-generator set a practically constant voltage can be maintained at the battery terminals with no loss, except the regular losses in the motor-generator set. Moreover, by obtaining any desired voltage the battery can be charged properly in accordance with the battery characteristics and thus insure better operation from the battery.

In reply to an inquiry as to the protection afforded a storage-battery motor against injury from overload, C. W. Chappelle stated that most locomotives have fuse or circuit-breaker equipment, and the motor is protected by either slipping the wheels, the circuit breaker opening or the fuse blowing. The slipping of wheels on a storage-battery locomotive will not hurt anything, and it acts as a safety valve against overloading the motor. As to the fuse, the only danger is that sometimes too heavy a copper wire is used as a fuse and when it does not melt at the proper time then a burnout is caused. The storage battery is a reservoir of energy and has a great capacity; this large capacity is used, not to handle heavy overloads on the locomotive, but to operate it over a considerable period of time at normal capacity. However, a standard five-ton Ironton locomotive having a rated drawbar pull of 2500 lb. has actually given 4000 lb. on a good clean rail. Motors used in storage-battery locomotives are not rated in horsepower but are based on a temperature rise of 75 deg. C. for a period of one hour. A 10-hp. series motor may be safely operated at 30 to 35 hp. for short periods of time or momentarily.

The question was asked what troubles occur with the battery itself. Mr. Chappelle replied that trouble is sometimes caused by a battery being improperly charged. The success of a battery locomotive depends largely upon the proper installation and charging of the battery; it is better to purchase



CHARGING TWO FIVE-TON STORAGE-BATTERY LOCOMOTIVES IN A MINE

The operator is shown testing the specific gravity of the solution in the storage-battery cells to determine the state of charge. The specific gravity (that is the density) of the solution in a lead storage battery varies with the state of charge and gives a direct indication of the condition of the battery

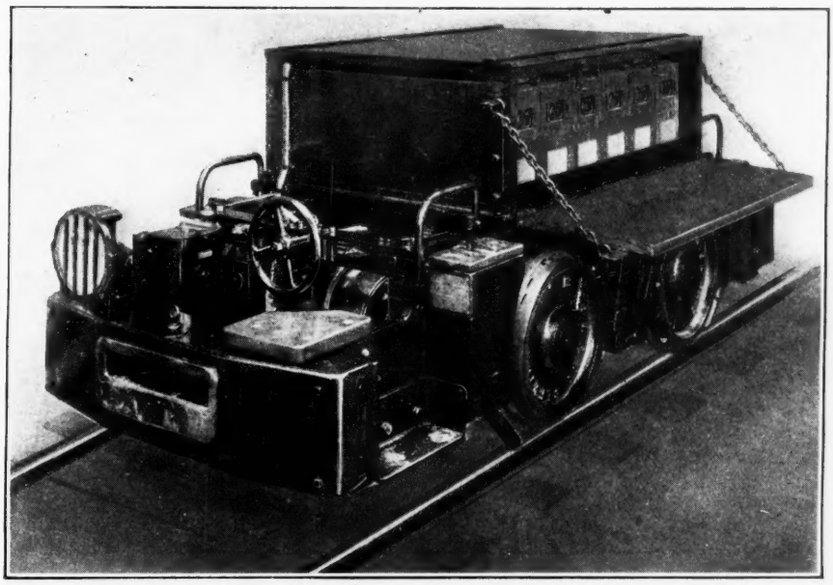
the charging equipment for the locomotive from the makers and thus get a complete unit designed to work together and insure against divided responsibility. Locomotive manufacturers furnish complete motor-generator sets and automatic switchboard equipment to properly charge batteries.

Mr. Milton here brought out some interesting points. In comparing the trolley and storage locomotives, he stated that in the former type the limit to power is the station; but this is not true of the storage battery. In this connection, power and energy should not be confused. The faster the current is used the quicker will the battery be exhausted; the kilowatt-hours determine the length of activity of a battery, and the rate at which the energy is used up is indicated by the pointer on the meter.

Continuing along this line of thought, W. G. Ferguson, of the power and mining department of the General Electric Co., of Schenectady, N. Y., stated that it has been some five years since the storage-battery locomotive was first installed on a practical basis in coal mines and that Mr. Chappelle no doubt recalled having witnessed the first trial locomotive which was placed in a mine near Cambridge, Ohio, and which was tried out for several weeks. This installation occurred shortly before the strike came on in Ohio and for certain reasons the locomotive did not prove satisfactory to the mine management. It was practically impossible to keep the locomotive on the rails due to the fact that it was being operated over mule tracks, and instead of hauling coal the locomotive would be on the ground for three or four hours each day.

The locomotive was taken out of this mine and resold to a mine in Indiana and has been in continuous use for several years, giving the owner remarkably satisfactory service. This bit of history was given in order to illustrate the main points to be brought out to the effect that battery locomotives cannot be applied haphazardly to coal mines, as conditions vary so greatly that failure will result in many cases unless a thorough study has been made of the situation. When applying storage-battery locomotives to coal mines, especially for gathering work, it is essential to know a great many things about the mine which are otherwise not necessary when applying the trolley type of locomotive. It has become the practice to apply trolley locomotives solely on a basis of weight and dimensions, as the amount of power used by the trolley locomotive is practically unlimited in quantity since it is derived from the trolley wire. The storage-battery locomotive is at a disadvantage in this respect because it must carry the power with it.

One must know exactly how the locomotives will distribute and collect cars, whether cars will be placed at and taken from the "face" or whether they will be delivered at the room necks. Furthermore, it is essential to know the weight of loaded and empty cars, approximate car output per day per locomotive, grade conditions, depth of rooms, side and height clearances, length of entry (whether this is single or double entry) and finally the location of the parting with respect to the working rooms. It is, of course, difficult at times for a prospective operator to accurately state all of these details, but he can as a rule give a very close estimate of how the operation of the mine will be handled. When all of these conditions are known, it is possible to calculate the amount of battery power necessary for a day's work and then the weight of battery can be proportioned to the weight of the locomotive chassis. It is obviously impractical to design a locomotive with an overbundance of battery capacity and at the same time obtain a locomotive chassis of sufficient weight and strength to carry this battery without obtaining a locomotive as a whole far out of mechanical proportions and very much heavier than necessary for the work. It is sometimes found to be the case that these gathering locomotives will be handled in much the same way as when mules are used. That is, if it has been the past practice to haul two or three cars with mules, the new user of battery gathering locomotives will doubtless continue to haul two or three cars with the battery locomotive, thus resulting in very inefficient haulage and requiring far more battery capacity than would otherwise be necessary if larger trips better proportioned to the weight of the locomotive are used.



FOUR-TON ELECTRIC MINE LOCOMOTIVE EQUIPPED WITH 48 CELLS

Continuing, Mr. Ferguson said that the locomotive will handle from three to five times as many cars as a mule, and when doing so will be working at the normal working load for which the locomotive was designed; thus it will use a less amount of battery power than if it is compelled to make frequent trips over a long track with a very light load. It should be realized that the weight of the locomotive is a large percentage of the total weight of the trip, and consequently a good deal of battery power is used up in operating the locomotive itself. A locomotive should not be loaded up to the slipping point of the wheels, as this condition causes the storage battery to deliver an abnormal rate of current which tends to reduce the battery capacity and the speed of the locomotive.

When the operation requires the handling of small trips and the cars are distributed over a wide area, it is better to plan on using two small locomotives rather than one large one, as the total amount of battery capacity needed for covering the extended mileage is so large and heavy that the locomotive itself will be inefficient and will use the battery power to a very decided disadvantage. In fact it is oftentimes the case that two locomotives of a well proportioned weight and battery capacity can obtain a given car output with less total battery capacity than would a large, heavy locomotive which carries the battery around all day long, hence uses power for moving this excess amount of battery. The above remarks are, of course, more or less of a general nature but they are capable of being proved by concrete examples. The main point which Mr. Ferguson endeavored to make was that one must know the amount of kilowatt-hours used by a given locomotive and make the most economical use of it.

A good deal of careful consideration should be given to the selection of the charging apparatus, as the life and safety of the storage battery depends to a great extent upon how a battery is charged and the safeguards taken to prevent a heavy reversal of current. Standard lines of charging panels are available from several large manufacturers who have made a special study of battery requirements and will furnish equipment best suited to the type of battery in use. The most important feature of the charging panel is the re-

verse current circuit breaker, which will open the main charging circuit whenever the source of power is interrupted either by opening of a station breaker or by short circuit between the generator and the storage battery. If short circuit occurs and no protection is provided, the battery may reverse the current and attempt to feed other apparatus such as pumps, fans and other machines that may be operating on the lines. If an 85-volt battery is being charged direct from a 250-volt trolley circuit, there is usually enough series resistance in the charging circuit to limit the amount of reverse current to a safe discharge value. However, if the circuit is not interrupted, the battery locomotive would be discharged in the morning instead of being charged, and consequently a day's loss would be the result. It is quite obvious, therefore, Mr. Ferguson noted, that one can afford to spend a few hundred dollars for the protection of the expensive storage battery.

When storage batteries are charged from a 250-volt circuit, it is necessary to use a regulating rheostat in the circuit to reduce the voltage of the trolley to that required at the terminals of the battery. Consequently, there is considerable loss in the rheostat itself. Take, for instance, a 48-cell lead battery. When it is charged by the so-called constant current method it requires 125-volt maximum at the end of the charge, and if a 250-volt trolley circuit is used, the loss in the rheostat will equal the amount of power put into the battery. An 80-cell Edison battery charged in the same manner will require 150 to 155 volts resulting in the loss of about 100 volts in the rheostat. If but one or two storage-battery locomotives are used in the mine, this loss of power in rheostats is not important, but when 10 or 12 locomotives are used the kilowatt-hours in the rheostat will be considerable and it is then essential to select a motor-generator set having a generator voltage equal to that required for the charging of the battery; thus the charging power may be used most economically.

In conclusion Mr. Ferguson stated that the storage-battery locomotive should be operated so that the loads will not be too large or too small for the rating of the locomotive, and a good deal of judgment should be exercised by the operator. Brakes should be used with discretion and this bad habit common to operators of trolley locomotives should be overcome. The storage battery should be watered regularly and charged in the manner prescribed by the instructions.

James Taylor, coal investigator of Illinois, introduced the subject of powder haulage and called attention to the strict state laws in this matter. He considered that if a storage-battery locomotive conveyed powder to the face that it might ground and explode the powder. However, as to the care of this type of locomotive, he believed it was no more care than a mule. In charging the storage battery the locomotive should rest on wood rather than T-rails, to avoid escape of electricity, provided such were possible. As a case of quite questionable management Mr. Taylor cited a mine in which four motors were used for haulage. It was the custom here to change around the motormen once a month; under this system a runner learned the grade on his haul and then exchanged with a motorman from another part of the mine, and both runners commenced over again to learn their runs.

Continuing on the subject of haulage of powder, the statement was made that a storage-battery locomotive undoubtedly was safer to use in such service than a trolley locomotive would be. Mr. Chappelle was of the opinion that a number of factors enter into the reason for this: the battery is in a steel compartment usually covered with fairly tight covers, and the electrical circuit of this type of machine, while it is running, is contained within itself; that is, the circuit is a metallic one, the current traveling from the battery to the controller, through the motor and back to the battery again. He agreed that in charging a storage-battery locomotive from a 200-volt grounded trolley circuit that it should be charged on wooden rails where possible. He also cautioned that an open flame should be kept away from the battery compartment at charging time, for the reason that if the gas which is given off at charging time is ignited then cracked jars or broken covers are liable to result.

Further, about the only way that sparking could occur in a battery locomotive while it was in operation would be by wiring trouble, controller or motor trouble, a loose cell terminal or the burning off of such a cell terminal. As to the production of sparks at the time when powder is being hauled, a mule can produce sparks by its shoes striking certain rock or steel. And as far as that goes, a man pushing a powder car might smoke. It is a significant fact that prominent manufacturers of explosives are using storage-battery locomotives in their works, as they are the safest mechanical method of haulage around plants of this character. The inference was drawn that there would be slight danger in coal mines comparatively from similar use of the battery locomotive. As a precaution, an empty car might be placed between the locomotive and the powder car which would seem to eliminate any danger from stray sparks; if an insulating drawbar was used, it should still further eliminate the possibility of any leakage current getting to the car. The comment was made that currents still could be transmitted through the track from the motor to the car; also if the empty car was wet, the insulation would be weakened.

An interesting contribution to the discussion was made by A. J. Moorshead, president of the Madison Coal Corporation. He stated that the selection of the method of hauling powder was a matter of safety and economy. In a general way, he considered that an operator was foolish to use storage locomotives for distributing powder. The Madison company is putting in storage-battery locomotives, but they will not be used for hauling powder. A special powder car has been devised by Mr. Moorshead which is expected to be electricity proof. Three powder transportation boxes are being constructed of two layers of wood between which is sheet asbestos. Wooden screws are used where fasteners are needed. The powder box is mounted on a truck and each car complete will cost from $100 to $150. Before being placed in active service, these cars will be tested; after the box has been filled with powder in cans, a wire will be passed round the box a number of times and a current of electricity will be turned on.

Mr. Moorshead went on to say that 25 per cent. of his time was given to investigating safety matters. In connection with haulage he noted that while mule drivers constituted 5 per cent. of the force, accidents to them amounted to 30 per cent. Also that 30 per cent. of expenditures for accidents was for drivers. As a class they are reckless and uncontrollable. Here Mr. Moorshead related a story which was particularly well appreciated, but the writer will not attempt to repeat, as a layman should never try to encroach on the special field of a pastmaster in an art. In view of his findings in the haulage situation, he gave storage-battery gathering locomotives a trial and found that while developing best efficiency, a storage motor displaced 3½ mules and on 320 tons of coal hauled a saving of 1½c. a ton was effected. Furthermore, this mechanical haulage eliminated 60 to 70 per cent. of inside coal transportation accidents. In view of all this, the Madison Coal Corporation is equipping its plants with storage-battery locomotives and considers them a good investment.

The transportation of powder in the state coal mines was of considerable interest to the members of the Illinois Mining Institute. Accidents from explosions of powder en route from the foot of the shaft to destination brought about the enactment of laws requiring all current to be shut off from a mine at times of haulage of powder. The main switch is securely fastened so that no current passes through the inside feeder wires. Two men lock the switch down and it takes both to open it. Mr. Moorshead states that the men of his company were taught the rule of strict obedience to orders in this connection—if they failed, they were given a good stiff army order. Many times the reason for accidents was due to lack of order, discipline and obedience; the latter two on the part of the employees of a company—the former in the case of a plant which does not have the good appearance a manufacturing concern should possess. Neatness and order about a plant are assets whose value often amounts to more than dollars and cents to a company.

Outbursts of Gas in Crowsnest Field*

BY JAMES ASHWORTH
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SYNOPSIS—*Describes certain violent gas outbursts which, with other causes, have closed down mines in the Crowsnest field. One mine gives off 15,695 cu.ft. of firedamp per ton of coal mined, the volume of the methane at atmospheric pressure being about 580 times the volume of the coal. One authority believes the coal is an unstable chemical compound and suddenly changes its condition. The presence of other hydrocarbons than methane and possibly the presence of hydrogen adds to the danger. The author advocates longwall methods for working such coal.*

IN 1914 I contributed to the Manchester Geological and Mining Society a paper entitled "Outbursts of Gas at the Morrissey Collieries." These mines were owned by the Crow's Nest Pass Coal Co., Ltd. In continuation of what was there stated I may say that after No. 1 mine was closed work was not resumed in this part of the coal field until 1907, when a new mine known as No. 7 was opened up.

This mine was lower down in the geologic section than No. 1 mine, and had an overhead cover of about 800 ft. The seam has a steep angle of dip (65 to 75 deg.) and a total thickness of 32 ft. Only about 16 ft. of the footwall portion was worked, and in the middle of that portion was a natural parting, separating the two 8-ft. portions, the bottom half of the coal being harder than the top part. The mine was ventilated by a force fan, and therefore the main haulage road became the return airway.

GAS FILLED FACE OF HEADING WITH SMALL COAL

The first serious outburst of gas in No. 7 mine occurred at the face of the main level on Jan. 27, 1909. It filled the level with small coal for a distance of 15 ft. from the face. The gas was given off in such a large volume that it extinguished a safety lamp 30 ft. outside the main entry. Yet a horse which was left inside by its driver was afterward found alive.

On Apr. 19 a second outburst occurred in the upper counter level, about 1550 ft. from the outside. It displaced 15 tons of coal dust and was accompanied by the discharge of a considerable volume of gas.

A third outburst took place May 5, in a raise in the soft coal between the main entry and the upper counter level. The raise was up about 25 ft. and 14 ft. back from the face. Two men were at work in the raise and had evidently attempted to escape, as one was found on the timber at the bottom of the raise and the other in the level below, both having been smothered by gas and dust. Only about six tons of coal dust was displaced. It may be noted that both the level and upper counter were open for several yards past the place where the raise was being driven up.

A fourth outburst occurred May 19 at the face of the main entry, soon after the miners had completed a setting of timber. A cracking sound warned them and they escaped to the outside without injury.

I visited this mine about a month after the outburst, and found that the displacement of coal had been almost entirely from the upper or softer part of the seam, and that the cavity extended upward about 25 ft. above the top of the timber, and also into the solid coal at the face and tapered off to a point in the last 6 ft. Below that taper the cavity would be about 8 ft. square. The amount of coal displaced was 75 tons and the volume of gas given off during six hours was estimated as 750,000 cubic feet (see Fig. 3, page 445).

DECIDED THAT IT WAS UNSAFE TO EXTEND MINE

After this outburst an inquiry took place, and in the end the management and three Government officials decided not to advance the levels any farther as there seemed to be no certain means of anticipating these outbursts. However, the mine was not closed down immediately. Some of the upper pillars were still worked until the railway company, which was using the coal for its locomotives, found it was of too small size to suit its requirements.

Moreover, the other collieries at Coal Creek and Michel were able to supply all the coal which the market needed. The coal seams of this part of the coal field, having been much altered by crushing and heat, would not make a good metallurgical coke; and this formed a further reason why operations were suspended.

Up to the date of writing outbursts of gas of such great intensity have not occurred at any of the other collieries in this coal field, and therefore it would seem that at Morrissey the special conditions of heat and pressure to which this end of the coal field has been subjected have not yet been found in other parts of the field.

The nearest approach to these disturbed conditions has been met with in the working on the south side of Michel Creek, where the strata are much disturbed by a severe twist. In this portion of the coal field large volumes of gas are driven off almost continuously, as set out in some detail in a paper read by the Chief Inspector of Mines of British Columbia before the U. S. A. Mine Inspectors' Institute at Joplin, in June, 1916.

He then stated that in old No. 3 mine on the east side of the slope as much as 15,695 cu.ft. of methane per ton of coal mined had been given off, resulting in the whole of the return air current being charged with methane to the extent of 2.66 per cent. as ascertained in actual analysis at Ottawa by Dr. E. Haanel. In the same part of the mine, when it was not at work, the percentage of methane in the air was 2.18. In the whole of the return air current of 60,000 cu.ft. per minute when the mine was not at work the methane content was 1.83 per cent.

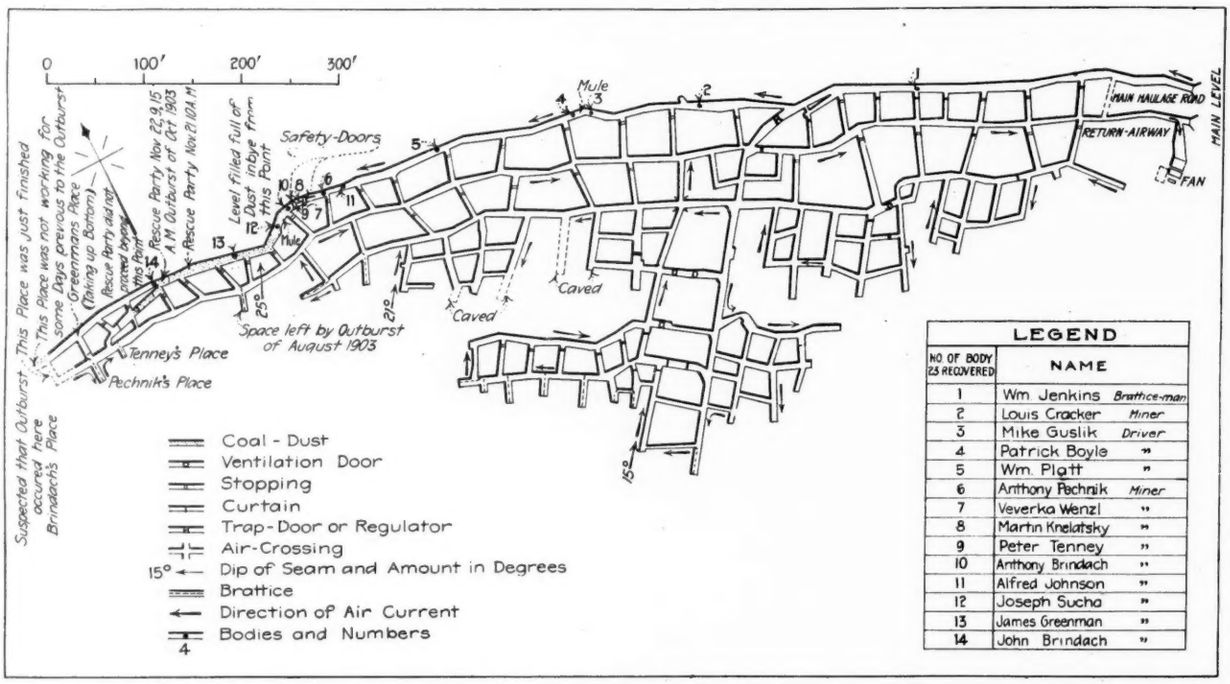
In No. 3 East mine it is noticeable that the greatest

*An abstract from a pamphlet entitled "Outbursts of Explosive Gases in the Crowsnest Pass Coalfield, British Columbia."

yield of methane was from the west side, and it would therefore appear that the special conditions which caused these abnormal emissions of methane must be situated somewhere between the old No. 3 and No. 3 East. On Aug. 3, 1915, while the mine was at work, the west side split contained 3.33 per cent. of methane or, as calculated, gave off 7392 cu.ft. per ton mined.

The highest reported percentage of methane per cubic foot of air, found while the mine was at work, was 3.83 in old No. 3 mine. These mines were worked by two shifts of eight hours each, and the average volume of methane per ton of coal mined, calculated from mine samples of the main returns, was 4326 cubic feet.

These figures are certainly extraordinary, and it is not surprising to find that when an explosion occurred Aug. 8, 1916, in No. 3 East mine, that so



LEGEND		
NO. OF BODY AS RECOVERED	NAME	
1	Wm. Jenkins	Brattice-man
2	Louis Cracker	Miner
3	Mike Guslik	Driver
4	Patrick Boyle	"
5	Wm. Platt	"
6	Anthony Pechnik	Miner
7	Veverka Wenzl	"
8	Martin Knelatsky	"
9	Peter Tenney	"
10	Anthony Brindach	"
11	Alfred Johnson	"
12	Joseph Sucha	"
13	James Greenman	"
14	John Brindach	"

FIG. 1. PLAN OF NO. 1 MINE, MORRISSEY COLLIERIES, CANADA, SHOWING EFFECTS OF GAS OUTBURSTS

serious was the damage to the mine that the body of one of the men killed has not yet been recovered.

The average thickness of the coal in No. 3 mine is given as 5 ft. and of No. 3 East as 11 ft. Both seams are bituminous and will make excellent coke without washing. The analysis of the coal from No. 3 mine is stated to be: Moisture, 1.01; other volatile matter, 20.95; fixed carbon, 71.00, and ash 7.04.

Both of the coals named are very friable, and, in the mining of them, explosives can only be used in limited quantity. The cover is about 1200 ft., in which thickness there are several other workable seams. It would appear, however, from the data thus far collected that the main volume of the methane emitted is principally built up in the coal seam itself or in some part of the coal seam.

While making an analysis of the gases occluded in the coals from this coal field it has been discovered—and the point is important—that they consist in part of gases of the higher hydrocarbon series. The gas, though usually described as firedamp, is not necessarily methane only. This is an important point to take into account, and in 1904 I came to the conclusion that some part at least of the gas given off in the large outbursts is "wet" gas, and is similar in every way to the wet gas given off, say, at the Dingman oil well in Alberta. From this well a percentage of gasoline is (or was) collected.

I believe, as I did in 1904, that some of the gases in the coals are in liquid form, and thus when the restraining pressure is reduced as the covering coal is removed, they volatilize and force away the coal in the finest of dust, and in this manner file out long cavities of irregular form (Figs. 2 and 3) which remain after an outburst has been dissipated. It is very noticeable that the dust found in these mines under ordinary circumstances is of a greasy nature, and that the higher hydrocarbon gases are found occluded in it.

Sudden outbursts of gas have received comparatively little notice either in British Columbia or elsewhere, but in May, 1919, a bulletin of the Canadian Mining Institute contained an interesting paper by D. B. Dowling, of the Dominion Geological Survey staff, on "Some Possible Chemical Changes in the Formation of Coal." He says:

> Experiments with pressure alone do not give results, since great periods of time are required; but when implemented by heat, there is evidence that there is a chemical change made by which the increased percentage of carbon is attained with very little actual loss of carbon.
>
> That there is an increased tendency to throw off gas with the rise in carbon percentage is acknowledged; and when it has reached its maximum the coal might in some instances be classed almost with such unstable compounds as explosives. There are accounts of slight shocks producing "blow-outs" of large dimensions in mines working the higher bituminous coals. This liberation of gas need not be considered as coming from pockets of compressed gas; but as following much the same course as an explosion of dynamite, which is simply the rapid rearrangement of atoms.
>
> It would seem probable that the formation of gas was

accompanied by a concurrent formation of a more stable coal compound, and when the alteration was violent the stable coal was brought along with the gas as dust. Dust not formed in this way, but from the operations of mining and handling the coal, should be considered more as a series of minute particles of unstable compound borne along by a small gas atmosphere of its own making, and therefore not easily laid by sprinkling, and only to be got rid of by ventilation.

Unfortunately, this paper by Mr. Dowling, as far as regards the foregoing quotation, did not elicit the least comment and has remained as a dead letter. In the annual report of the Minister of Mines of British Columbia for 1909, the chief inspector of mines, Frank H. Sheppard, remarked on page 225:

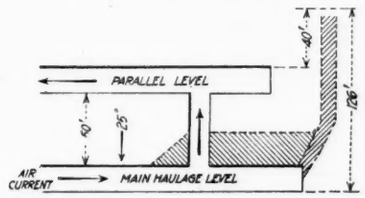


FIG. 2. COAL BLOWN INTO HEADING IN NO. 1 MORRISSEY OUTBURST OF AUG. 6, 1903

> The question of dealing with these outbursts is the most important and difficult problem to cope with in this field. If this portion of the field is to be worked at all, it must be under conditions which will give the miner some chance for his life. Most of the outbursts in this field have been attended with loss of life.
>
> The whole question devolves upon the possibility of relieving the pressure ahead of the working face. If this cannot be done, it would be inhuman to ask or allow a miner to take chances such as are not experienced in any other industry. If the field is valuable, and this may be readily conceded, it would appear that the operator could go to considerable expense in experimental work, having for its object the safe winning of the field and the protection of the lives of those who may engage in its development, and it would be a reproach to modern engineering skill to admit that the problem will not admit of a reasonably safe solution.

When we wish to cure a disease the first and most important point is to diagnose it correctly, and similarly, in this serious problem of sudden and violent outbursts of explosive gases, we need if possible to find out when to expect them, and secondly, how to deal with them in safety. The need of experimental research into practical matters of this sort needs no emphasizing, because the lives of hundreds of miners may depend on their solution; and moreover, it may be anticipated that the problems will increase in importance as the mines extend farther away from the entries, and where large areas of goaf are closed off.

Up to the present no system of working has been consistently followed. Pillar and stall has been the usual method, and this has introduced the question of the proper size of the pillars, especially where "bumps" have been of frequent occurrence. In the latter cases it cannot be averred with any confidence that large pillars have given any better results than medium or small pillars; but there is no doubt in my mind that no system has given such excellent results as longwall.

There are many instances where pillar and stall has been the system adopted; this has later been changed to longwall, and this in its turn has been changed back to pillar and stall. In some cases the reasons given for the adoption of pillar and stall have been that this system gave the minimum of expense in moving dirt; in another case that there was not sufficient material to form substantial packs, and where there was material with which to build packs, that the cost of making them was entirely prohibitive due to the insistence of the miners' union officials that the miners should receive for "clod" a fixed price per inch thick, for each square yard removed.

It is of course possible to have a special gang of men to build the packs, but where it is possible it is better for the miners to build their own. In longwall working it is of the greatest importance to control the settling down and breakage of the roof, so as to maintain as regular a pressure as possible on the coal face.

In workings of longwall type, where gas in the floor gives trouble, it naturally escapes over a large area and does not break out in sudden and dangerous volumes, as it frequently does in pillar-and-stall working. Dangerous "bumps" seldom happen in longwall working after the first roof break has occurred, and therefore it is fair to conclude that bumps are mainly due to a combination of causes—the settling of the roof and the gas in the floor.

As there are several modes of working a mine on the longwall principle it is necessary that the management should choose that one which will give the lowest cost of extraction, and he should not be in a hurry to change the mode of working just because a few heavy roof settlings occur. The success of longwall working depends on the regularity of the breaking down or bending of the roof, or as it is often described, "roof control."

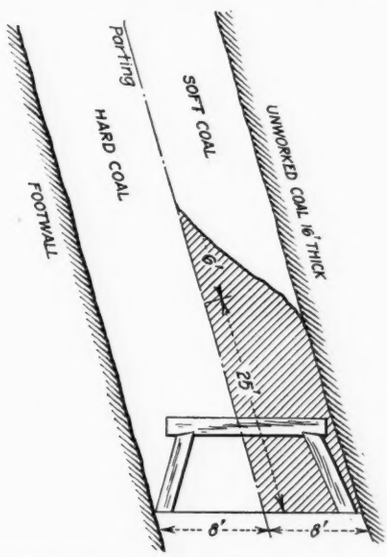


FIG. 3. OUTBURST OF MAY 19, 1909, AT MORRISSEY NO. 1

The longwall method of mining coal has another most important feature to recommend it, namely, that the mine is much easier to ventilate and therefore much safer and requires less brattice cloth. In longwall working the greatest trouble is experienced when the roof and floor are "very good," for they must be made to either bend or break.

In mines such as those in the Crowsnest Pass coal field it is advisable in many cases to drill holes in the floor, particularly where rolls or faults are met with, and thus relieve the tension of the floor gas.

From the soft nature of most of the coal seams in the Crowsnest Pass and the absence of "backs," "slines" and natural partings, which are common in many coal fields, these coals drain slowly, and this fact is a principle cause of the abnormal outbursts of explosive gases.

Since writing the foregoing notes the official report on the explosion in No. 3 East mine at Michel, on Aug. 8, 1916, has been published in the Minister of Mines Report for 1916. This states that the explosion occurred during a heavy thunderstorm, and shortly after the night or repair shift had gone into work at 11 o'clock. From the card that automatically records the water gage of the fan it is calculated that the explosion occurred about 11:20. No one outside the mine actually heard the explosion, or if they did, the noise was assumed to be caused by thunder. A miner who had just come out of the mine, and was on his way home, it was afterward learned, did not realize that an explosion had occurred.

Fan Engineer First to Learn of Explosion

The discovery was not made until the fan engineer, who had two fans under his care, visited No. 3 East fan and found wreckage in the engine room and other evidence of an explosion. The main entry to the mine was completely closed, and the exploration party had to go in through an old prospect opening. A fire in the main return airway from the east side was fortunately discovered and extinguished without further disaster.

The body of the fireboss was found some distance away from the remains of his safety lamp. It was assumed from this and other indications that the force had come from the main slope and not along the return airway. "The gauzes of the fireboss' lamp were badly crushed and showed evidences of alkali stain, as of the lamp having been heated." This would suggest that he had met with gas in the return air as soon as he had passed through the main separation doors; but his death was due to violence and not to burning, as his hair was only slightly singed.

The evidence showed that the miners had only just reached their working places when the explosion occurred. Thus the miners working in No. 6 slope face had undressed and put down their dinner pails and then returned to No. 13 parting to assist in rerailing a car left by the previous shift.

Careful measurements of the main return-air current from this mine showed that the air was saturated with moisture; that its volume was 120,000 cu.ft. with a velocity of 1500 cu.ft. per minute; that 2,194,560 cu.ft. of methane was given off during a working day, when 550 tons of coal were produced or at the rate of 3990 cu.ft. per ton of coal. The volume of the methane produced was calculated from the analyses of samples of air taken in the main return.

While testing samples of air from the Michel colliery, the Dominion government analyst, Dr. Haanel, has proved the presence of hydrogen and found indications which have shown "that hydrogen is not an uncommon constituent of mine airs." The presence of ethane has also been estimated as being one tenth of the methane present.

To those who have seen safety lamps tested in mixtures of hydrogen and air, it is not difficult to realize what dangerous conditions may arise when a miner entering his working place immediately hangs up his lamp on a prop without first making a test for gas. Miners as a rule do not appear to appreciate the importance of observing the law in this matter, as was shown during an inquiry into a more recent explosion in the same district.

The safety lamps in general use in British Columbia are of the bonneted Wolf-Marsaut type, burning gasoline or benzene. With regard to their safety, it is to be noted that Marsaut, while making his long series of tests by raising his double-gauze bonneted safety lamps into a quiescent explosive mixture of gas and air, did not consider such lamps as absolutely safe, and hence he added a third superimposed gauze which is the correct construction of the true Marsaut safety lamp.

It must be obvious to every reader of these notes that the necessity for devising some means to insure the better protection of miners' lives has now been amply demonstrated, and I therefore submit in conclusion that the time has arrived when these dangers ought to be carefully looked into by a special research commission or committee, and at as early a date as possible; and finally, that the system of developing and extracting such seams of coal as those referred to should be defined by such commission and strictly enforced by Act of Parliament.

Education—the Financial and Social Barometer

By R. Z. Virgin
Elkins, W. Va.

We are fighting a great war—the greatest conflict the world has ever known; and we are waging it upon a scale and in proportions greater than the most expert authority would have dared to describe a short time ago.

The corporations operating coal mines have been called upon to produce the coal necessary for the successful operation of manufactories that are working on war material; for our navy and army needs; for our transportation machinery; for our homes; and to make up the shortage in output of our Allies. All these requirements have multiplied many fold during the past year and will continue to multiply during the duration of the war. This unprecedented demand for fuel must be met, and this, too, while the supply of labor to produce it is being conscripted for war work or prompted by patriotic impulses is volunteering its services for duty overseas.

This condition, coupled with complex problems of transportation, is more serious than most readers imagine. The solution must be worked out by men of mature experience and judgment, in order to get the maximum energy and output in the minimum time, and simultaneously conserve the lives and limbs of the workmen; also to conserve our coal resources with the greatest caution.

By educators and mining men such questions as the following are asked frequently: "How can this be done?" "What would you advise?" "What are your ideas of solving this important problem?"

The answer is, "Educate the workmen." Education is the greatest producing agency in the world and makes for 100 per cent. efficiency. The days of the hill-top mines are gradually drawing to a close, and with deeper mining, more machinery, more elements of danger, a larger need for the coal, less men to get it with, and the men who would manage our mines through advancement in the regular course of promotion going to the front, we must do something, and do it quickly. Otherwise we will not have sufficient men in training to officer our mines when such officials are most urgently needed. Many of the large corporations are training their own men to officer their works; and they pay them salaries while they are learning the things necessary to enable them to properly discharge their prospective duties.

Almost every newspaper carries high encouragement to men who would make good in their particular line. The Bell Telephone Co., the Western Union Telegraph Co., and many other concerns have adopted this plan, and our Government is training thousands of men to officer the army and paying good wages for the time spent in learning. What is the mining industry doing toward educating its workmen for responsible positions?

Mines Losing Their Younger Men

The men of the mines between 21 and 30 years of age, the material for the very best officials, are gradually being called to the colors, leaving, to fill their places, men of more mature years—those past the usual age at which men attend school. These men must be educated. This is no longer a question of how it may be done; but it must be done, and at once, if we expect to get out the coal that is demanded of us and keep our death and accident rate down to a minimum. It would never do to officer our mines with inferior men and bring about an accident rate equal to the death rate in the army. Many workmen yearly meet death in our mines during normal times, and an inferior class of officials would not lessen this death rate.

It is true we have our night schools, our first-aid classes, our moving pictures, etc., illustrating the right and wrong ways to do work in our several plants. The men of the mines willingly give up their leisure time and sometimes their sleep (depending on which shift they work) in order to obtain an education along their respective lines of work. But one night a week, or perhaps one night in two weeks, is far too little to accomplish our purpose in the time at our disposal. Again, while the men discuss problems among themselves they have ordinarily no one to refer their questions to, and the result is they fail to get far in their studies.

The State of West Virginia realizes the importance of the education of her miners, and has appropriated a sum of money for the expenses and salaries of vocational teachers, who work under the direction of the officers of the State University. These instructors give lectures and practical demonstrations to workmen at about 10 different points, which they reach about twice each month.

I am of the opinion that mining companies will soon come to the point where they will follow the trend of other industries, and pick out ambitious men and school them at their own plants, five or six days a week, pay them while learning, and not require them to study on their own time after work. A large company employing several hundred men would be in a position to secure a competent teacher, who could probably visit two plants per day, holding school in the forenoon at one, and in the afternoon at the other. Thus no workman would need spend his evenings after work in school, but could rest at home with his family and have time for thought over his previous lesson, on his own porch or in the comfort of his own rocking chair.

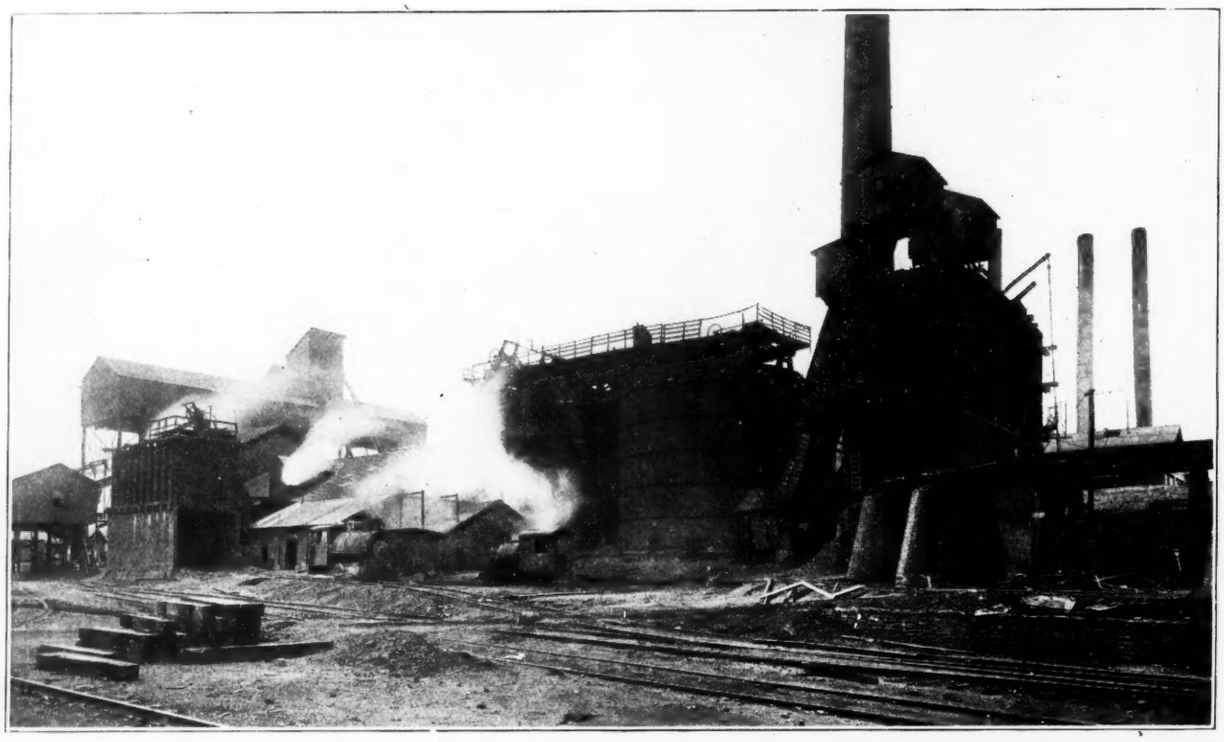
If we look at the pitiable condition of Russia, with its illiteracy in all degrees, we can judge from our own condition by comparison, that education surely pays large dividends. We can no longer say, "Look what we are doing for our workmen now, in comparison to what we were doing a year or so ago." A brand new condition is upon us. We must see things through new spectacles, and ask ourselves, "Are we doing the same, or more, for our men than other industries are doing?" We can no longer be tolerated when we say, "I did not get anything when I dug coal, unless I worked hard for it, and nobody did anything for me."

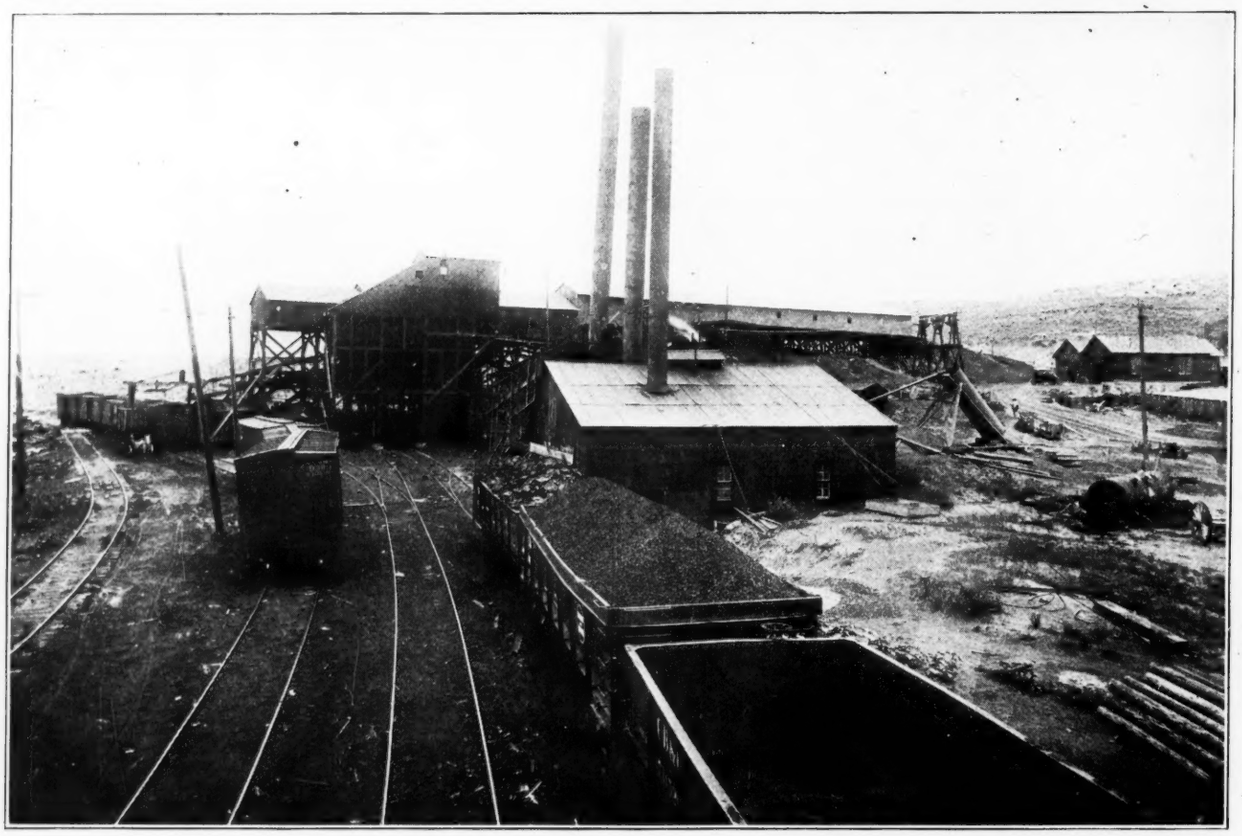
This is a revolutionary period. The foregoing statement applies in coal mining as well as in other industries, hence we are called upon to do things we never dreamed of before. We must therefore educate our men, or go backward. It would be decidedly un-American if we failed to keep pace with progress. The several responsibilities thrust upon us during this crisis must be met with the best there is in us. We will then find that the social and financial barometer is education.

Combustion in Commercial Furnaces

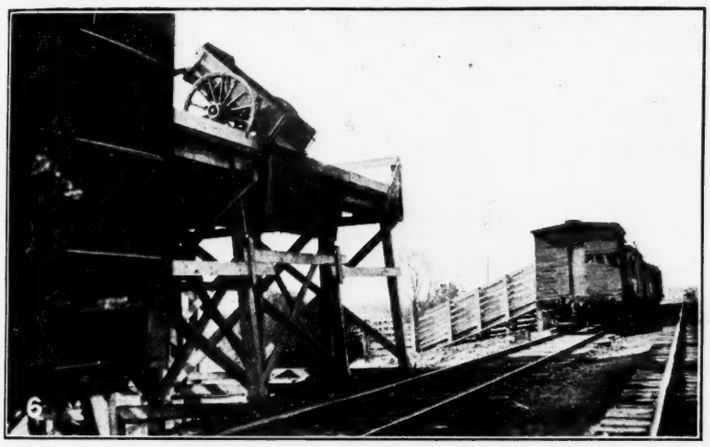
In commercial furnaces the combustible gases and the oxygen seldom form a perfectly uniform mixture, hence the rate of burning is not altogether controlled by the law of mass action but largely by the rate of mixing. This is especially true of the furnace gases near the surface of the fuel bed. The combustible gases leave the fuel bed in a solid stream containing little or no free oxygen. To this stream of combustible gas air is added through the firedoor or other special openings. If this air is added in comparatively large streams that are not agitated, the streams of combustible gases and the air may flow through the furnace for some distance in more or less stratified streams, and the combustion takes place only along the surfaces of contact and be slow. Such combustion makes itself evident as long flames. When the air is added in a large number of small streams, or when the large streams are agitated so that they break into a large number of small streams, the surface of contact is large and the combustion is rapid, approaching the velocity of combustion of a uniform mixture. —*Bureau of Mines Bulletin No. 135.*

SNAPSHOTS IN COAL MINING





UPPER VIEW—SURFACE PLANT OF JAMISON COAL AND COKE CO., GREENSBURG, PENN. LOWER VIEW—SURFACE PLANT OF SHERIDAN COAL CO., DIETZ, WYO.



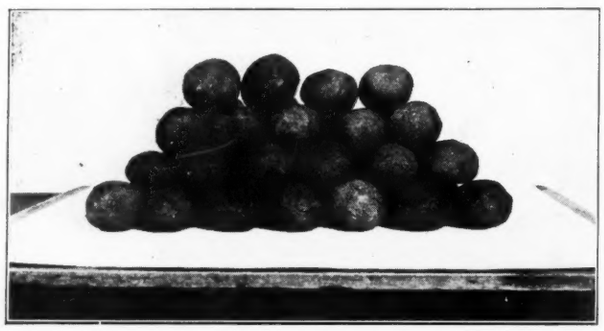
Views of H. H. McDowell Coal Stripping at Worland, Mo.

Fig. 1—View of the coal vein, showing its thickness and depth of overburden. Fig. 2—First box pit, Western elevating grader loading Western 1½-yd. wagons. Fig. 3—Same view as in Fig. 2, wagons proceeding to dump in distance. Fig. 4—Close-up view of wagons climbing hill to the dump. Fig. 5—View of coal vein, showing H. H. McDowell in position for loading Western three-wheel wagon with which coal is being hauled. Fig. 6—Car-loading platform, showing method of loading railroad cars from three-wheel dump wagons.

Homemade Fuel

The accompanying illustration does not show a tempting pile of doughnuts at some Y. M. C. A. hut "somewhere on the western front" in France. It is anthracite fuel made by hand in Wilkes-Barre, Penn. M. S. Hachita, chief chemist of the Lehigh Valley Coal Co., was responsible for this addition to the fuel resources of the region, and *Coal Age* is indebted to him for information about the manufacture of the fuel illustrated.

It seems that in Japan much charcoal is made and considerable fine powdered material results from the handling of this product. The fine charcoal is utilized by mixing it with 25 per cent. of clay and moistening



ANTHRACITE FUEL MADE BY HAND

the mixture with just enough water to permit balls to be formed by hand. The clay acts as a binder. When dry this fuel is burned similar to other combustibles. Having this in mind, Mr. Hachita experimented with the fine coal dirt which collects in streams in the anthracite field at places where pools form. At such spots in the river flowing by Wilkes-Barre, coal dirt in its finest condition may be found.

In river dredging at the place noted about 15 to 30 per cent. of clay is mixed with the fine coal. The practical point about it is that this coal is where everyone can use it and have an opportunity to secure a supply of fuel. Just as it comes out of the water it should stand for a while, to drain off surplus moisture. When it reaches the consistency of mud which can be readily shaped up by hand into balls about 2 to 2½ in. in diameter, it is ready for manufacture into fuel. When molded into shape it should dry in the air for several days, after which time it may be handled with a shovel.

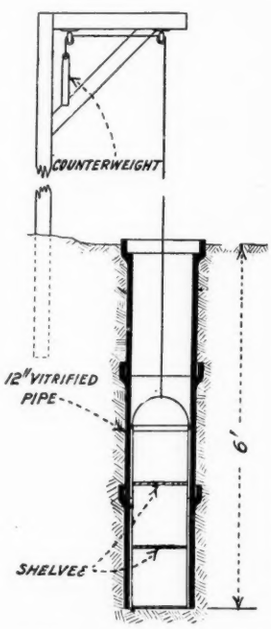
There are no special difficulties connected with obtaining a supply of this material at many of the streams throughout the anthracite region. A double purpose would be achieved in the utilization of this fine coal from the creek beds. The companies directly interested would have their creeks dredged and the people doing the work would get a coal supply for a nominal sum.

In using these coal balls in an ordinary stove, the fire can be started the same as with ordinary briquets —they burn much the same way. As the balls burn they get harder; the moisture is driven off and they harden similar to bricks under manufacture. The ashes resulting can be worked out of the fire much the same as in the case of an ordinary coal fire. The burning balls also can be stirred with little danger of their breaking. The facts noted in connection with the utilization of this creek coal mud are not merely the results of laboratory experiments. The method described, from start to finish, was worked out by Mr. Hachita and pronounced a practical success. If followed by the people who can readily obtain the raw materials, they will secure a fuel supply which can be stored against a time of scarcity of coal. It is another patriotic effort which will be effective in proportion to the amount of this waste product which is worked up into available fuel. It should not be shipped any great distance, as its high ash content would be wasteful of transportation facilities. But it will release for transportation coal needed for domestic consumption at distant points. Also it is doubtful if the balls would stand much handling in bulk.

On a large scale the material could be cut out with a shovel into cubes six inches on a side. It could be handled similar to peat, to which it approaches in regard to amount of heat available on combustion. Clay has been used as a binder in briquets, but it adds much impurity to the fuel made by this method. Therefore it would find its chief field of usefulness close to the point of manufacture. Reference to this matter is made at this time as possibly offering some suggestion as to the mechanical handling of fine coal on a commercial scale. During times of fuel famine some processes may find application which were discarded at other periods of fuel overproduction. The benefits of saving and conservation are assuming special importance at present.

To Keep Workmen's Dinners Cool

At the Dayton flood-prevention work, coolers, consisting of three lengths of vitrified pipe set vertically in the ground, are used to form a well into which a dinner pail can be lowered by a rope and pulley. This serves to meet the problem of the absentee iceman, says *Engineering News-Record.* Three lengths of drain pipe will line a well 6 ft. deep, as shown by the drawing. At this depth the ground is as cool as the inside of the ordinary refrigerator. To contain the food, a tin bucket 11 in. in diameter and 3 ft. high is fitted with shelves and a full-length hinged door. The bucket is also provided with a bail for handling. Two pulleys, a length of rope and a counterweight complete the outfit. Ordinarily the pulleys are fastened to the shed roof of the kitchen, but a post and bracket like those here illustrated may be employed with advantage. Any tinsmith can make the bucket, using inch boards for the shelves. This "iceless refrigerator" was devised by H. H. Rupe, superintendent of carpenters at the Englewood reservoir.



DINNER PAIL COOLER

Poor Car Supply Hampers Production

Efforts to stimulate coal production are being offset and hampered by irregular and inadequate car supply. While the figures from the Railroad Administration indicate a great improvement in this particular, they are misleading. After having had Saturday night, Sunday and Sunday night to handle cars, the railroads frequently are able to have on mine sidings 150 per cent. car supply. On Tuesday and Wednesday they often are able to keep the car supply above 100 per cent. By Saturday, however, car supply probably has dropped to 50 per cent. By totaling the six days, the railroads show a good percentage of cars. The figure is misleading, however, as the mine can utilize only 100 per cent. of cars and the excess early in the week is of no advantage.

Great enthusiasm has been aroused among mine workers in numerous cases recently when all previous records of production have been broken. Enthused by such a performance everything has been ripe for a determined effort to keep up the rate of production, only to have the whole plan spoiled and enthusiasm permanently dampened by a complete fall-down on the part of the railroad to supply the necessary cars.

It is noticeable that while every one concerned in the coal-mining industry is active in an effort to raise the morale of the workers to an unprecedented height, no such activity is in progress among the employees of the railroads. If every employee of the transportation lines could be imbued with earnestness to get the maximum efficiency from every coal car, it is believed that car supply would soon cease to be the principal limiting factor in the production of coal.

Coal the Paramount Lord of Industry

As a part of its effort to stimulate production, the Fuel Administration is circulating in all coal-mining districts the following extract from an address by Lloyd George to representatives of mine workers in the United Kingdom:

The blood which pulses through the veins of industry in this country is made of distilled coal. In peace and in war King Coal is the paramount lord of industry. In war it is life for us, and death for our foe. It makes the material and the machinery which it transports. It fills weapons of war. Cannon means coal. Shells are made with coal; shells are filled with coal. The very explosives inside them—coal; and then coal carries them all right into the battlefield to help our men. Coal is the most terrible of enemies, and the most potent of friends. There have been in this war 350,000 casualties of British soldiers inflicted by German coal—by the Westphalian miner working in coöperation with the Prussian engineer, without stint, without reserve, without regulation, putting their strength at the disposal of their Fatherland. It is coal that caused those casualties. Yes, and when you see the seas clear, and the ocean over which the British flag flies with impunity from realm to realm and from shore to shore, when you find the German flag vanished from the face of the seas, who has done it? The British miner helping the British soldier.

We must pay the price of victory if we mean to get it. Victory has its price. We have but one question to ask ourselves, of all ranks, of all grades and trades. Are we doing enough to secure victory? Because victory means life for our country. It means the fate of freedom for ages to come. There is no price which is too great for us to pay which is within our power to pay. Freedom implies the right to shirk. But victory is not in that road. The trenches are not all in Flanders. Every pit is a trench in this country—a labyrinth of trenches. Every workshop is a rampart, every yard which can turn out munitions of war is a fortress. Picks, shovels, lathes, hammers—they are as much the weapons of this great war of European liberty as a bayonet, a rifle and a machine gun; and the man who does not handle them with all his strength is failing as much in his duty as the soldier who runs away from the battle at the front.

Cardinal Gibbons Would Honor Miner Who Stays at Work

Cardinal Gibbons wants to see the same honor accorded to those who mine coal as is given to those who actually face German bullets. He has written a letter to Dr. Garfield which, it is believed, will have great weight with mine workers. The letter in full is as follows:

I have read with great pleasure the proclamation of the President of the United States with regard to the fuel situation. Like a great many other Americans I have been very much alarmed at the outlook for next winter. It is to be hoped that those whose business it is to get coal out of the earth will see how much depends upon their labor, and what a patriotic work they perform in providing that which is really at the present time the sinews of war.

The very fact that we have conscription puts a responsibility on every man in the country either to fight or to work, as the Government may think most necessary for the public good. The very fact that certain kinds of workers are put in a deferred classification is to my mind an indication to them that their real duty is to do that particular kind of work, because through the particular kind of work which they can perform the country will be more greatly helped and the war more easily won. But just as it is the duty of those who are called to fight to fight bravely and to allow their patriotism to be the informing principle of their courage, so is it necessary that those who work should work in the same strenuous and patriotic manner.

There are, I think, two classes of people who can help very much in this regard. The first class is composed of the families and neighbors of the men who are put into a deferred classification. As the President has so truly said, these people should treat the men who are working when often they would much rather be fighting, with the greatest respect, and should show that they recognize and honor the patriotism which holds men to their posts in the coal mine as well as the patriotism which holds a man firm in the trenches.

The other class which I think could be of very great assistance at this time is the clergy, and I sincerely hope that every minister of religion, especially in the mining districts, will put before his congregation the great principle that patriotism is devotion to country; that those who love their country must serve ther country in the most acceptable way, and must give their services, not where they would choose, but where the Government thinks they could be most useful; and that those who do stay behind to work must remember that they are working for their country and are holding up the hands of their countrymen now fighting across the seas, and that therefore they must put every ounce of energy and manhood into the work which they are asked to do.

I hope for the very best effects from the President's proclamation.

"Tuckahoe" Breaks All Previous Records

On her last trip to Boston, the "Tuckahoe" went in and out of port, discharging nearly 5000 tons of coal in 31 hours. This is several hours under the time any other collier has taken at the port of Boston during this month. The average of 19 ships discharging at Boston during the half week of the "Tuckahoe's" visit, Aug. 5-8, was 135 hours and 54 minutes. During the half week ending Aug. 15, the fastest time in and out of Boston was made by the "Lake Duncan." She was 34 hours and 8 minutes in port. The average of 25 ships discharging at Boston in that period was 124 hours and 48 minutes.

The port performances of the best colliers in the New England trade, compared with the average of all colliers in it, for the half-week ending Aug. 12, were as follows:

Loading Ports—Baltimore, average of seven ships, 60 hours, 54 minutes in port. Best ship, "Tampico," 30 hours, 54 minutes in port. Norfolk and Newport News, average of 12 ships, 34 hours, 42 minutes in port. Best ship, "Bay View," 18 hours, 42 minutes in port.

Discharging Ports—Boston, average of 21 ships, 116 hours, 30 minutes in port. Best ship, "Northern Queen," 49 hours, 54 minutes in port. Other discharge ports, average of 17 ships, 100 hours, 18 minutes in port. Best ship, "Bay State," at Providence, R. I., 42 hours, 6 minutes in port.

To Rush Supplies to Coal Mines

The extent of the difficulties being experienced by mine operators in securing supplies is being realized for the first time with the establishment of the Mine Supply and Equipment Section of the Production Bureau of the Fuel Administration. This section was recently created with Roy A. Rainey and David D. Bush in charge.

Information regarding inability to secure supplies already is reaching the bureau in large volume. The number of complaints is increasing daily, as it is becoming known more generally that the Fuel Administration is giving specific attention to this work, so that no production may be lost through delays in receiving supplies.

In addition to looking after priority matters, Messrs. Rainey and Bush are giving equal attention to matters of transportation. By their aid, supplies and equipment are moved through embargoes and otherwise expedited while in transit. Through their close coöperation with the War Industries Board and the Railroad Administration, they are able to eliminate much of the routine procedure which otherwise would be necessary.

The Mines Supply and Equipment Section can not undertake the tracing of freight. It will be incumbent upon the operator to ascertain where his shipment is being delayed and the nature of the cause for its delay.

Applications for Opening New Mines Now Being Considered

Consideration now is being given to the 700 pending applications for permission to open new coal mines. These applications are being handled by a committee headed by Frank G. Jones, of the Fuel Administration. Mr. Jones states that each application is receiving exhaustive consideration. The sole thought in their consideration, he points out, is to increase the production in the near future. Many applications can not be granted, Mr. Jones declares, because the same labor utilized in an operating mine would produce more coal than could be secured from a new mine. Another important question which has to be determined is whether the railroad serving the mine can handle a greater tonnage. These are the most important questions which must be settled after it has been ascertained with reasonable certainty that the mine to be opened is likely to become a producer. Only when convinced that a new operation surely will increase production of coal will permission be granted to open a new mine. To date, 215 bituminous applications and 9 anthracite applications have been approved.

No Pledge Required from Coal Industry

In the affidavit required for the securing of priority, reference is made to the pledge required by the priorities division of the War Industries Board. No such pledge is required from the coal industry, and no operator need hesitate in the execution of the affidavit on that ground.

Defines Meaning of Word "Replacement"

In paragraph (p) of the regulations governing priority in production, the use of the word "replacement" has given rise to misunderstanding. The paragraph reads as follows:

"(p) For the operation and maintenance (not new construction, expansion or replacement) of coke oven plants, mines, smelters, furnaces, rolling mills, wire drawing mills, pipe and tube mills, employed in the production of fuels, metals and metal products—A-6."

"Replacement" in the sense used in no way refers to repair parts. The priorities division has issued a formal ruling to that effect.

Irregular Car Supply No Excuse for Drop in Coal Production

Because car supply may be irregular and at times inadequate is not regarded at the Fuel Administration as a legitimate excuse for slowing down production. A few operators have replied to appeals to stimulate production by asking the value of trying to increase production when they are without cars so much of the time. One hundred per cent. Americans, keenly anxious to win the war, will find a way of meeting such a situation without allowing production to slow down in the least degree, says the Fuel Administration.

Anthracite Production Grows

Anthracite coal production for the week ended Aug. 24 showed an increase of 167,600 gross tons above the record for the preceding week. The total output, according to estimates of production furnished by the mines to the United States Fuel Administration, was 1,706,016 gross tons, compared with 1,538,416 gross tons for the week of Aug. 17, 1918, and 1,589,454 tons during the corresponding week of 1917. Of the total tonnage, 1,126,677 gross tons was prepared and pea sizes and 579,339 gross tons steam sizes.

The average production per working day for the week amounted to 284,336 gross tons, compared with 264,909 gross tons during the corresponding week of 1917. The estimated total production for the coal year beginning Apr. 1, to and including Aug. 24, is recorded as 33,384,380 gross tons, as compared with 32,689,219 for the same period during 1917, an estimated increase of 695,161 gross tons.

Great Fuel Saving in Connecticut

The administrative engineer of the Bureau of Conservation of the United States Fuel Administration in Connecticut reports that those industrial plants which have furnished answers to the fuel saving questionnaire are, in a majority of cases, making the changes suggested in the power-plant recommendations. Eighty plants, consuming for the year ending May 1, 1918, practically 337,000 tons of coal, as a result of the conservation changes suggested will save at least 15 per cent., or over 50,000 tons of coal, annually. This state had previously reported from similar sources an annual coal saving of approximately 31,000 tons.

The administrative engineers in Michigan, Kansas, Georgia, North and South Carolina and Florida have reported marked savings of coal in industrial plants as a result of the practical demonstrations of conservation.

Records Broken in Connellsville Region

Where the car supply has permitted, there has been marked stimulation of energy in bituminous coal-mining regions. A report recently received by James B. Neale, Director of Production of the United States Fuel Administration, is to the effect that for the week ending Aug. 23 the Connellsville field showed a production of 716,954 net tons, breaking all previous records for output for this district.

Coal Mines to Receive Necessary Power

Coal mines in the Pittsburgh district will not have to accept their pro rata share of the power curtailment. An order to this effect has been issued by the War Industries Board at the suggestion of the Fuel Administrator. Industry had expanded in the Pittsburgh district until the West Penn Power Co. was overloaded. This was followed by a breakdown in generating machinery. While coal mines are allowed their full quota of power from the West Penn Co., other war industries have had to curtail their outputs.

A questionnaire will be sent to coal operators within the next few days with the idea of ascertaining specific information with regard to those who derive their power from central electric power plants.

To Conserve Mine Material

Along with his efforts to secure priority for all needed supplies for coal mines, D. D. Bush, of the Fuel Administration, is taking steps looking to the closest conservation of mine materials. Information in his hands indicates that many wasteful practices are being permitted. In addition to stopping wastes, he is calling to the attention of mine operators the good results which will follow the substitution of the less needed materials for those needed in the war program. Priority will not be granted for steel ties, if wooden ties are obtainable. The use of substitutes for steel roofing is being urged. An asbestos composition weather boarding, which can be used in place of galvanized iron or other more needed material, is suitable for covering and other buildings, it is being pointed out. Mr. Bush also is asking the operators to clean up their scrap piles and salvage every available pound of metal obtained.

Brief Washington Notes

R. R. Horner, C. L. Colburn and W. J. German, of the Bureau of Mines staff, have been commissioned captains in the engineer corps. Mr. German already is in France.

M. D. Edmonds, one of the editors of the Philadelphia *Public Ledger*, has agreed to give three months of his time to the Fuel Administration to assist in the campaign looking to increased production.

Saving of coal, running as high as 15 per cent. of the state's consumption, is being reported from several states as a result of economies effected at power plants, it is reported by the Fuel Administration.

E. E. White, production manager for the New River and the Winding Gulf fields, reports to the Fuel Administration that farmers in the territory under his jurisdiction are spending their days in the production of foodstuffs and are working overtime at night in the mines.

Vague reports from Europe indicate that after the war the world will be informed of some extraordinary developments in the utilization of bituminous coal in certain countries, and that these developments will become of pressing importance to manufacturers in the United States.

High Lights in the Coal Situation as Seen by the Cartoonist

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

The union leaders are not disposed to let the wage-scale question die. It will be recalled that the district presidents of the United Mine Workers of America met on Aug. 22 and requested the Fuel Administration's approval of the reopening of the wage question in all mining districts. The petition said: "Again and again we will come to you in behalf of the mine workers." The union in effect put itself in the position of the creditor in Hindustan who sits on the debtor's doorstep till payment of the sum demanded is fully made.

The Fuel Administration promptly replied that it could not allow an increased wage. Dr. Garfield said that he had informed President Wilson, when the last increase was granted, that there would be no more during the war, and in reply to what was said about bonuses he declared that he would correct the evil, where proved, by reducing the price limit. As a start he announced his intention of lowering the rate 20c. in the Ohio and Hocking fields and 5c. in all the other fields of Ohio except the Eighth district. He did this because it was from these points that he received most complaints about bonuses.

LABOR LEADERS EMPHASIZE HARD-COAL WAGE

At first the leaders appeared disposed to regard the decision as final, but pressure from the anthracite region developed, and on Aug. 26 they made representations to Dr. Garfield urging that the hard-coal mine workers deserved consideration even if the scale in the bituminous region was not to be revised. They pointed out that the rate of pay in the anthracite field was lower than in the bituminous region.

There is some humor in the situation. The miner in the bituminous region got an increase in his wage rate because he could not live with unsteady work—two or three days a week—if he were merely accorded a fair fate of pay. Now the anthracite mine worker edges up and says that the bituminous mine worker is getting more pay per day than has been granted to him. Soon we will hear from the bituminous mine worker. He will assure us that as his work is irregular his monthly wages are less than the monthly wages in the anthracite region and are therefore too low.

LABOR PROGRESSES BY DRIVING SALIENTS

In this way wages work their way upward. The man with the low daily rate believes he is wronged, and as soon as that is corrected the man with the lower monthly rate is heard from. So it goes. A similar seesaw is found in the payment according to the difficulties in coal extraction. For hard or thin coal a differential is demanded, because the miner cannot make a living in such a tough or tenuous measure. Then when he has obtained the increase demanded the man who has the softer, thicker coal cannot see why the operator with coal having such advantages cannot afford to pay him the higher rate per ton.

The mine workers in this way drive salients into the line only to consolidate them later into a continuous front. If, by its unrest, labor only fought a real enemy it might be congratulated. But when it bites, it bites itself, as spiders are said to sting themselves to death. The consumer must pay the increased cost of production, and, as workingmen are themselves consumers, in the long run the workingman must pay the increased wage demand.

The anthracite union leaders declare that the mine production will suffer if work in the mines is not made more profitable. If only the munitions industry would bear more kindly with irregular workers it would get quite a few of the less diligent who now stay at the mines largely because of the laxity of mining rules. Unfortunately, the steady work at higher pay is a great incentive to the steadiest of men, whom the coal companies are trying most earnestly to keep on their pay rolls.

The Federal and state employment bureaus are trying to save the day in the anthracite regions by hunting up the loafers and sending them to the mines for work. Men who have been getting their living by their wits or have depended on their relatives for their subsistence have been carefully listed, and they are being diligently rounded up by the authorities. The coal company officials have declared their intention to accept the men as fast as they are escorted to the mines. All who fail to turn up at work will be reported to the proper authorities.

"WORK OR FIGHT" BEGINS TO HAVE MEANING

The Philadelphia and Reading Coal and Iron Co. has appointed men to visit the homes of the company's employees whenever the men are idle. They will ascertain just why they fail to report at the mines. Where the only reason is dissipation that fact will be reported to the proper authority. It is said that if labor cannot be recruited around the hard-coal regions, men will be imported from such Western States as have no labor shortage at the present time.

At the Sandy Run colliery of M. S. Kemmerer & Co. 75 men struck on Aug. 22 to induce the company to pay their daily transportation charge between Freeland and the mine workings. Sandy Run is in the southern part of Luzerne County.

The day before the strike just mentioned saw the end of the strike at Williamstown, which, as will be recalled, is in the Lykens Valley region to the southwest. The mediators of the Bureau of Labor on Aug. 20 visited this mine with the intention of ending the strike. As stated last week, the drivers at this colliery were asking wages equal to those accorded to drivers in bituminous mines. The difference had closed down the mines for a full week. The compliance with the demands of the Bureau was immediate. The men went back to work on Aug. 21. Promise was made that a conference at Washington between the drivers' representatives and the operators would occur sometime during the present month.

MORE DISSATISFIED MINE DRIVERS STRIKE

The driver boys at the Pine Brook Colliery, Scranton, Penn., of the Scranton Coal Co., have also been on a strike for a higher wage of 15c. per hour, and this has interfered with the production of the miners of that colliery, reducing the output 3000 tons per day. The miners are able to work only about half time.

A native of Germany, Werner Nowak by name, who after nine years had reached the position of mine engineer and superintendent of the Edwina Coal Co., of Garret, Somerset County, Penn., was arrested recently and confined in the Allegheny County jail as a dangerous enemy alien. It is charged that he alleged that "America will be glad to kiss the Kaiser's toe before the war is over. I am a German and will never take out naturalization papers."

At turbulent Colliers, a mining town in Brooke County, and in the West Virginia Panhandle, 275 mine workers recently went on strike. They were employed at the Locust Grove mine of the West Virginia-Pittsburgh Coal Co. The miners were formerly paid by the car and not by weight, at least each car regardless of its actual loading was paid for as having a certain number of pounds

loaded on it. The men demanded that they be paid by the actual weight each car contained and that a check weighman be placed on the tipple, all of which was done. But the foreign miners did not like the weight that the weighman entered. A series of tests by inspectors, union men and miners did not satisfy them, and they went on strike despite the orders of the union officials, who denied the allegations of the miners and forbade the resort to a strike.

Frank Ledvinka, the president of the subdistrict, announced during the strike that "there is no strike at Colliers as far as the United Mine Workers of America are concerned. The men are out in direct violation of our agreement. The strike has no sanction from the United Mine Workers." James H. Dahm and William C. Liller, of the Bureau of Labor, brought the mine workers around when the efforts of the union failed. The mediators made the mine workers sign a resolution pledging loyalty to the United States in the war.

Earn Labor Day by Working Overtime

At the opposite end of the state is the mine of Monongah, operated by the Consolidation Coal Co. There the miners had a much different spirit from the men in the neighborhood of Colliers. They felt they wanted to keep Labor Day and also that they did not want to see the tonnage suffer, knowing how badly it is needed by the transports, battleships and cruisers on the ocean. They agreed to accept the company's offer and they worked overtime on Friday and Saturday of last week, thus making up their full quota.

A different story comes from the same region, the Fairmont district. After reciting what the Monongah men have done we hesitate to tell the other story because it can apply to only a few men. It appears that a small minority of the men in the Tygart's branch of the Monongahela River have found life somewhat unendurable since West Virginia became bone dry and they have been distilling a spiritous liquor out of raisins. It is known by the euphonious name of "Old Hen." In order to stop this misuse of so harmless a comestible, the Food Administrator has been asked by the Harrison County Council of Defense to regulate the sale of raisins and grapes in the Fairmont region and provide for their sale in small quantities and for strictly household use.

Mines Too Near Benighted Pennsylvania

But this trouble is a mere circumstance to that in Monongalia County, for while Harrison County is well south of Pennsylvania, being protected by the width of two bone-dry counties, Monongalia County is so handy that wetness and even a genuine "soak" is attainable at the expense of a few cents for railroad fare or a few dollars to a jitney driver. The men of Monongalia County, of which Morgantown is the principal city, make weekly and even daily trips across the line to purchase intoxicants at Point Marion.

The prosecuting attorney is securing data to see just what effect the shocking wetness of Pennsylvania is having upon the production of Monongalia County.

From these men who have more interest in Old Hen and John Barleycorn than in the waging of the war, it is a pleasure to turn; for there are a number of extremely patriotic people in West Virginia. The Italians at Hepzibah, just north of Clarksburg, the principal town in that Harrison County where Old Hen is wont to be brewed, have contributed money each month to enable W. R. Butts, the president of the local, to tour the country and address meetings urging the miners everywhere to produce maximum tonnages. W. R. Butts has a son in the service and he loses no opportunity to preach the gospel of large production.

The funeral question has come up for solution at Page, W. Va., a village on the Virginian R.R. in Fayette County. The miners have adopted a resolution pledging themselves to produce as much coal as possible and to encourage others to do the same. They further resolved not to let a fatal accident in one mine affect the operation of another mine, and ruled that the death of a miner or a member of a miner's family, not due to a mine accident, shall not affect the operation of the mine. However, funerals are to be attended, as before, by a burial committee.

A. W. Calloway's mines in the Upper Potomac region have done their level best since the United States went into the war. Nowhere perhaps is the spirit of service more hearty than at the mines of which he is (or perhaps rather was) general manager, for he is too busy now to give them much care. Sergeant Lee Manchel of the British Army has been speaking at Thomas, Coketon, Bencush, Davis, Pierce, Henry and Kempton. Democratic, earnest and patriotic, the purposeful spirit of Mr. Calloway has done wonders to make the workmen of the Davis Coal and Coke Co. put their every effort into a support of the war.

Shorter-Time Strike in New River District

Before leaving West Virginia, a strike has to be recorded, this one in Fayette County. Somehow it is impossible to get along without these troubles. This strike is at the Kilsyth mine of the McKell Coal and Coke Co. At last report it has lasted seven days and had withstood an attack from the Fuel Administration without settlement. Apparently the miners want to change or, would it be more correct to say, to shorten the hours of work?

In Illinois, the Tuxhorn Mine, at Springfield, is still working irregularly because of the factional fights between the black and white members of the local union. Some time ago the local had an election and a negro was elected. The whites complained that the election was conducted unfairly, and a clash between the miners resulted. For a while work at the mine was stopped, but District Attorney Knotts urged the men to return to work. Then there was another election, and a claim was made that this was illegal, and the men quit work again. Part of them have returned to the mines pending a settlement of the controversy, the dispute being referred to State President Farrington.

Frank Farrington, who was invited to form one of an American labor body to visit England, France and Italy, has declined, believing he can do greater good boosting the production of coal and maintaining goodwill at home than by going abroad, pleasant, as he says, the trip would be. Alexander Howat, the president of the Kansas mine workers, is in Europe as a representative of the Socialists who favor the continuance of the war. A service flag with several hundred stars representing the mine workers in the tenth subdistrict of Illinois who have joined the army and navy was dedicated at the Labor Day demonstration at Johnson City. The Divernon, Ill., local of the United Mine Workers has received a banner from the state organization in recognition of its having made the largest contribution to Red Cross work in Sangamon County. The union has 78 members in the army and navy.

We are informed that the operators in Illinois have been asked by the local administration to keep close track of all absentees from the mines and of the reasons for deficient tonnage from whatever source.

From Alabama comes the grateful news that the miners worked on Labor Day. For many months the Alabama men have been disposed to work irregularly, but at last they have arrived at such a state of patriotic resignation that they are willing to work even on that labor festival.

Wanted Four Bosses To Stay in the Union

On Aug. 16 the Dominion Coal Co., at Sydney, Nova Scotia, offered to pay a bonus to shippers and loaders. The announcement was made to the Amalgamated Mine Workers' Union. On Aug. 25 the mine workers of the Nova Scotia Steel and Coal Co. in Sydney mines went on strike to compel four deputies to retain their affiliation with the union. The employees demanded that the deputies be discharged. These deputies formerly occupied an unofficial position and when raised to official rank they decided that membership in the union would prevent a proper discharge of their duties. They accordingly resigned. The company, through the general superintendent, Thomas O. Brown, stated that it was opposed to deputies remaining in the

union ranks, but did not recommend these men to resign. In fact, Mr. Brown rather blamed them for doing so. In consequence of a conciliatory letter from the management the men returned to work.

At the Brule coal mines of the Canadian Northern, near Edmonton, Alta., a strike occurred on Aug. 21 as a protest against the alleged unsanitary condition of the washhouse. The chief mine inspector, who visited Brule, is said to have confirmed the charges of the miners.

Miners Deny That They Are to Blame

Six hundred miners of Belleville, Ill., recently protested by resolution against the charge that the miners are to blame for the present coal shortage which threatens to become acute during the coming winter. The action was based on the report of a committee which had made an investigation of the car supply, and which reported that ten mines were idle in the Belleville field as a result of car shortage. The closing of the mines laid 1500 miners idle and cut the output for that day 15,000 tons. The committee reported that in the past month there had been a loss in output of 100,000 tons in the Belleville field, due to car shortage. The resolution concluded: "We, the miners of Local No. 99, consisting of 600 members, go on record as resenting all accusations and insinuations that tend to reflect upon our loyalty and patriotism and we brand our accusers as the instruments of disruption whose aim it is to fan the flame of disloyalty and sow the seeds of dissatisfaction among our ranks. Those who make such charges are in short spreading German propaganda."

John F. McAuley of West Frankfort, Ill., has written to a St. Louis newspaper complaining that the men working at that place have been able to work only 27 days since May 1 and on these days the time of working has been restricted running only two, four or five hours. The last day they were able to work was July 26. The cause of the irregular work is the lack of sufficient electric power to operate machinery. Yet most of the mines could have been working, he says, with or without electricity. "We could shoot our coal from the solid," he adds, "as we did before machinery came into existence and as they are now doing in smaller mines where the companies have not the capital to install machinery. Our mines are equipped with steam hoists. Our fans are run by steam, and at some of the mines mules haul the coal cars. Those who have electric locomotives could have purchased mules and the coal would cost only a few cents more. No changes would be necessary in the haulage road or in any other part of the workings." He concludes by saying that with facts as they are the coal companies cannot avoid the charge that they are slackers.

Some Howat Understudies in Kansas

In August the placidity of the Kansas mining situation was broken and Kansas became Kansas once more. More matters were brought up for adjustment than in any similar period for several months. Fortunately, most of these matters have been settled amicably, and all of those which have been brought up in regular procedure are in process of adjustment.

The first strike for several weeks occurred Aug. 16 at No. 9 mine of the Girard Coal Co., near Pittsburg, Kan. This mine has a long record for strike activity. The demand was for the discharge of a mine foreman. After two days, the men went back to work under orders of the officials of the United Mine Workers; but one day they failed to work, the next they let the mules run away and work had to be suspended, and on the two following days the miners alleged that the air was insufferably bad, although inspectors had approved the condition of the mine.

The miners are back at the Howat tricks. It is wrong to strike and a violation of the contract, but you cannot work if there are no mules or if the air is bad, so if you can arrange the first and plead the second it is quite easy to shut down the mine. Alexander Howat is in Europe, but his understudies apparently are still in Kansas.

Wages Adjusted to Living Costs

A commission was appointed some time ago in Alberta, Canada, to ascertain every four months the change in the cost of living, the wage of the miner being made dependent on their findings. This commission is composed of W. F. McNeill, representing the coal operators; Frank Wheatley, representing the miners of District 18 of the United Mine Workers of America; and F. E. Harrison, representing the Department of Labor. It takes sworn statements regarding the cost of certain necessities and staple commodities and ascertains in like manner the increase in rentals, fuel and light. It has held sittings at Calgary, Lethbridge, Blairmore, Edmonton and Drumheller in Alberta, as well as at Fernie in British Columbia. Prices of commodities were also taken at Nordegg, Mountain Park, Canmore, Bankhead, Coleman, Hillcrest, Pocahontas and Brule. As the last increase was given Apr. 1, the new rate dates from Aug. 1. The schedule of costs is given below.

Commodity	Expenditure per Week Apr. 1	Aug. 1	Change, Per Cent.
Meats	$5.0241	$5.3458	+6.403
Produce	3.9040	3.8538	—1.286
Groceries	6.6560	7.4986	+12.659
Clothing, etc., boots and shoes	5.9579	6.3605	+6.7574
Rent	2.25	2.25	Unchanged
Light	0.50	0.50	Unchanged
Fuel	1.4520	1.4520	Unchanged
Coal bill	0.3208	0.3208	Unchanged
	$26.0648	$27.5813	+5.818

The weekly increase is $1.5165, and that is roughly 25c. per day. This was the increase awarded.

Relationship of Coal to Ships

The Fuel Administration must depend upon ships to supply two great and important sections of our country with coal to keep the people warm and to maintain the constantly increasing industrial activities necessary to the proper prosecution of the war. New England, crowded with great war plants which are turning out a multiplicity of material for our army and navy, must be supplied to a large extent by ocean shipments from southern tidewater ports. The overburdened railways cannot carry more than approximately one-third of New England's coal supply for the year. The remainder demands ships. Without them the wheels of New England's war industries must stop, and New England's people must suffer.

The great section of our country at the northern end of the Great Lakes must likewise depend upon shipping for its coal supply. A great fleet of coal-carrying vessels must be in constant service from the lower lake ports to the great coal docks of Lake Superior and Lake Michigan, throughout the open season, if the great Northwest is to secure its winter coal supply. The enormous tonnage of coal demanded by this section cannot be imposed upon the already overburdened railroads. It must move by water and it must move while the Great Lakes are open for navigation.

All of this means ships, and as the program of the Shipping Board continues to be worked out, ships, sufficient to carry the coal supply, become available. Today ships are available to move the constantly increasing coal production. But railroads, ships and coal must grow together in order that a coördinate machinery may be always at hand to keep the nation supplied with fuel.

Fuel is a vital factor in maintaining the nation's shipbuilding and in moving the nation's ships after they are built. As the armies of the United States in France are enlarged, which enlargement is steadily going on, the materials to support them will have to be increased correspondingly. This means more ships to move the commodities of warfare; it means more materials which have to be manufactured; it means increased railroad capacity to forward raw materials and finished products; it means more factories to produce more materials. All of which, depending on ships for the final transportation over three thousand miles of ocean, likewise means more coal.—*Dr. H. A. Garfield, United States Fuel Administrator.*

EDITORIALS

Education and Labor Unrest

MANAGEMENT has taken two views of education. One view is that the workman should know as little as possible and then he will calmly accept what is offered. He will not know any better. The plan really doesn't work so badly till a little light, by some chance, leaks in. Then the trouble begins—the workman, realizing his power but not knowing that it is hedged around by economic limitations, is inclined to demand all that he desires. He believes that the reason he has so little is because he never made a concerted demand before, and it takes some years of social unrest and discomfort to make him realize that a capacity for protest may exist without a power of fulfilling all that the protestant seeks. He has never thought seriously about social affairs, so he has no balance when he does begin to think.

The stablest condition is when every man is thinking and has been trained to think. When a man thoroughly understands how the people around him are thinking and acting, he is quite apt to appraise them and himself with something approaching justice. He is not likely to be hurried into courses which he and everyone else would have reason to regret.

Schools, therefore, that are true schools, that mirror the affairs of the world with a large degree of truth and completeness, are the safeguards of democracy. They assure us of social freedom, but they also in a very real sense give us every protection against social license, and they make it possible for everyone to exercise all the duties of citizenship, which, we take it, is as much to work and produce as to nominate candidates and vote.

Few necessities around the mines are so important as schools, and yet in most cases the payment of teachers is far too low. The teachers in the schools are too often chosen from the families of school directors. As a result they have not had the advantage of an outside environment. They do not mirror the outside world to the scholar, but rather show him the community which the scholar already knows. They are therefore too often narrow in their views and to that narrowness they frequently add the grossest incompetence.

Nothing matters more than the school. It should be taught by bright and intelligent instructors. It should put the seed of thought into the minds of future workers and give them a power for intelligent action in all their future work. There is a great advantage in having a workman who can understand and expand an idea, who can fit in with a new method, who can use a new machine or make a record of performance An educated man is interested in new development and new plans, but an unschooled man who has never been taught that there is anything in life but eating and working has no conception outside of these things. The school should give him new aims and purposes and raise the scholar from the rut of circumstance onto a highway of progress.

But especially are schools needed for foreigners. We complain about their stupidity and disobedience to orders, but we cannot hope that they will understand what we say or rightly evaluate its importance till they can speak our language with facility. They will never enter American life till they learn the native tongue. Every mining village should have its English night school taught by the most competent teacher available, with dumb show, illustration, and a clear enunciation of the sentences taught.

These matters cannot be left to chance. Some employee of the company in every mining town should be elected to the school board and daily agitate for improved conditions—adequate schoolhouses, suitable curricula and competent teachers. An operator is just as much responsible for seeing that he has the right personnel at the mine as that he has the right water in his boilers or the right oil in his cylinders. He cannot get the right kind of employees unless he interests himself in the schools where the coming men are trained. If he cannot look so far, he can at least see that a good school will attract to his mine those persons who have sufficient intelligence to seek a good education for their children. Such persons have doubtless endeavored to secure what education they could for themselves.

Do Mine Workers Drink Too Much?

A QUESTION which has aroused heart burnings throughout the mining regions is whether the mine workers imbibe too freely, and rightly or wrongly every mine worker in the industry immediately and uncompromisingly denies that the mine worker is more intemperate than any one else. After all, is the necessity for an answer imperative? If there is any intemperance, large or small, the result will be decreased production. A little, therefore, is too much. We must rid ourselves of that little by every means in our power, and to aid us in ridding ourselves of it we must appeal to the union leaders for their assistance.

It is no empty flattery to congratulate the mine worker on the sobriety of the men he puts in charge of the union. If the mine workers as a whole were as temperate as their district presidents, vice presidents, secretaries and members of their international board, the question of temperance would never have arisen.

In fact, when the National Coal Association declared for temperance the temperate men in whose hands the mine workers have placed their affairs did nothing to antagonize the movement. It appeared to appeal to them. Some said something that sounded

so like "Aye, Aye," that they were recorded as being entirely in favor of the proposition.

The nonbibulous majority of the mine workers, busy at the mine, engrossed in their work, which is also the work of the nation, had nothing whatever to say. The bibulous, however, always the loudest of talkers, made such a stir that the union leaders were practically obliged to take up the cudgels for the "workingman's beer," whether they so desired or not, and now most of them are lined up on the side which they do not favor. It remains now for the patriot mine worker to assure the union leaders of the strength of the temperate men and to convince them that whether drunkards be few or many, such men are not willing to do their duty as citizens and so need to be restrained by the temperate majority.

The mine workers who believe that the necessities of the war demand national sobriety must not keep their opinion to themselves. It is a belief to be emphasized as strongly as the belief in the importance of buying Liberty Bonds. If men who fail to subscribe to a national loan may be ducked in a pond or ostracized from society, the same may be done to the miner who fails to dig his quota and regards his daily turn as less important than his daily tipple.

Protect Equipment from Lightning

ONE source of considerable needless trouble and loss at coal-mining plants is the injury and burning out of various electrical equipment by lightning. This source of difficulty is most acute and annoying in the spring and early summer. Seldom in the latitude of central and northern United States do violent thunder-storms occur before the vernal equinox, neither are they numerous after the autumnal equinox.

As a general rule, atmospheric electrical disturbances are most numerous between the vernal equinox and the summer solstice, or roughly between April 1 and July 1. On the other hand, such phenomena seldom occur between about December 1 and March 1. The late summer and early fall are by no means devoid of electrical storms, but these storms are as a rule neither as numerous nor as violent electrically as those of the spring and early summer.

The transmission lines from a power plant form excellent conductors for the induction of electrical potential from lightning. As is well known, the phenomenon of lightning is merely the discharge of electric energy of small amperage but extremely high potential from one object or region to another. Thus lightning may flash from one region or locality in the air to another, apparently from cloud to cloud or from a cloud to the earth.

When the difference in potential between two localities is thus relieved by a discharge of lightning, any and probably all conductors in the vicinity are subject to the flow of an induced current. Almost every one has at some time or other received a more or less severe shock from some ordinarily harmless conductor from an induced current of this kind, and other things being equal the longer the conductor the more severe the shock. Thus a stove, particularly if it have a long stovepipe, a line shaft, a wire fence, the eave spouting of a house or a telephone are all well known sources of such shocks. Many a farmer has lost cattle or horses through their being in close proximity to or in contact with a wire fence during a thunder shower.

Various pieces of electrical apparatus such as generators and rotary converters are probably quite as sensitive to such induced currents as are animals or human beings. Suitable protective devices properly installed will protect such equipment from harm, but many operators either do not provide lightning arresters at all, or if they do provide them they permit their installation in so careless a manner as to defeat the purpose for which the arrester is provided.

A large and well known manufacturer of electrical equipment recently wrote *Coal Age* upon this subject in part as follows:

> We are being caused a great deal of extra work, most of it entirely unnecessary, due to the failure of users of electrical machinery to provide proper lightning protection; or, having provided same, to have it properly installed and kept in good condition. During the early spring we sent out a circular letter to a vast number of our customers urging them to install ample lightning protection so that we would not be called upon at all hours of the day and night to perform all kinds of repair work in order to keep up coal production, which was being retarded because of lightning damage to motor-generator sets and direct-current engine-generator sets.
>
> We have no interest whatever in the sale of protective apparatus, but do have use for every minute of our workmen's time without having any of it spent on repair work which could and should be avoided by the proper installation of lightning protection. It is, in fact, a conservation of resources which we wish to secure.

It would appear that no intelligent coal operator would need to be urged to protect his electrical apparatus, any more than he would need to be urged to insure his boilers or place safety valves upon them. Such neglect may or may not result disastrously to the unprotected equipment. The chance for a burnout is present with every thunder shower; the means for adequate protection is comparatively inexpensive, while a mishap of this kind means much more than the cost of repairs. The logical course to pursue would thus appear to be clear and plain. Why not follow it?

Coal Mining and Three-Inch Shells

IT IS sometimes hard to bring people to a realization of the duty which they owe to one another, and to the nation in particular. A case in point is the apathy with which the coal miner has responded to the many efforts made to speed him up, by the urgent pleas on behalf of necessity and patriotism for more regular labor and greater efficiency during working hours. Nothing, perhaps, will aid more in bringing the miner to a full conception of his manifest duty toward the country, at the present time, than the translation of his endeavors into terms of ammunition, ships and supplies. For example, the statement that four shovelfuls of coal mean a three-inch shell for use against the Hun is one that every miner can comprehend—in fact, he can almost visualize shells as he blasts and loads his coal. When all the miners in America begin to dig coal on the basis of so many shells for every mine car full of coal, it won't be long before the Kaiser begins to sue for peace.

He Is Writing To You!

YOUR BOY IS WRITING TO YOU ABOUT HIS GLORIOUS WORK IN THE TRENCHES-FOR YOU. CAN YOU WRITE TO HIM ABOUT THE PATIENT WORK YOU ARE DOING IN THE MINE-FOR HIM; THE TONS OF CLEAN COAL YOU ARE MINING; THE BONDS YOUR WORK IS BUYING; THE SAVING STAMPS THE CHILDREN ARE SAVING AND THE FLAG YOU SALUTE AS YOU GO TO YOUR WORK? BE AS BIG A PATRIOT AS YOUR BOY!

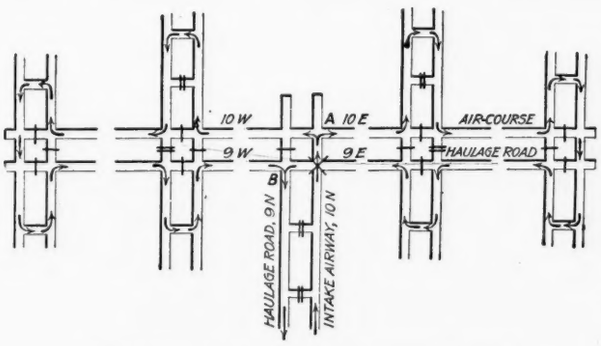
COAL AGE

DISCUSSION BY READERS

Use and Location of Booster Fans

Letter No. 1—Kindly permit me to refer to the question asked by "Mine Superintendent," *Coal Age*, Aug. 8, p. 287, regarding the placing of a booster fan to assist the circulation of air, which has become inadequate, owing to the increased development of the mine. While the answer given to this question appears to be correct, there is room for a little discussion, and I want to ask for a further explanation in regard to the suggested location of the booster "on the return end of the air circulating in that section."

From the description given and the Figs. Nos. 1 and 2, showing the present and the proposed circulations of air, I understand that the prime mover or ventilator is located at the surface and is unable to furnish sufficient air under existing conditions. Now, referring to the proposed circulation, as shown in the second figure, which is repeated here, the main air current is split at



SHOWING THE PROPOSED CIRCULATION

A, being divided equally between the two sections of the mine, and the two currents are again united when they reach the main return airway and haulage road at *B*.

While agreeing with the statement made in the editorial reply and knowing from experience that results will be more satisfactory when a booster is placed at the return end of the air, it is not clear to me how that can be done in the present case, where there are two separate air-courses to be considered.

I assume that it would not be practicable to place the booster on the main return air-course, which is the haulage road in this case. It is possible, however, that the intention is to use two boosters, one in each split. Otherwise, I do not see how it is possible to avoid locating the booster fan in this case on the main intake airway, outby from the split *A*, so as not to interfere with haulage operations.

Permit me to say that my experience is that boosters are a great help located at any point in the circuit. At the same time, I admit that a booster fan located on the intake will increase the leakage through faulty stoppings; but, is it not true that the depression caused by a booster located in the main return airway will produce the same result? I should be glad to be enlightened further and hope to see this question thoroughly discussed, as it is a practical one in the ventilation of mines.

WILLIAM LAWTON.

Seattle, Wash.

This correspondent has offered some very pertinent suggestions in drawing attention to the fact that the wording in the editorial reply to the question, on page 287, inadvertently conveyed the wrong impression and did not express the meaning intended in regard to the proper location of the booster.

The words "on the return end of the air circulating in that section," should have read, *at the inby end of the air current in that section.* It is true that whether the booster is located on the intake or the return airway, in any section of the mine where the circulation is deficient at the face, its action would have the same effect to increase the leakage in poorly built stoppings, since this leakage is determined by the difference of pressure between the intake and return airways. The action of a booster located at the inby end of the air, in any section, however, is to cause a *depression* on the intake and a *compression* on the return airway, in that section, which will result in decreasing the leakage through stoppings. We shall be glad to have this question fully discussed.

Dealing with Slackers in Mines

Letter No. 2—There are many ways in which the half-hearted citizen can dodge his obligations to the Government, but all who do so belong to the same class and can justly be called "slackers." It would seem that fitting punishment, in one form or another, should be dealt to all whose waning patriotism would cause them to be numbered in this class.

In coal mining, the man who loads dirty coal because of neglect, indifference or greed of gain is as much a slacker as the miner who absents himself from his place without excuse, or who fails to put forth his best efforts to increase his daily tonnage. There is no room in the mines, today, for the idler or the careless or indifferent worker.

THE UNSCRUPULOUS SLACKER

The sale of Liberty Bonds and War-Savings Stamps, by the Government, however, has developed another form of slacker, who fills a unique and unscrupulous rôle. This man willingly pledges himself to buy War-Savings Stamps, or signs an application for one or more bonds. In the solicitation for the purchase of bonds he is the acme of generosity. Realizing that the man who can give no reasonable excuse for not buying a bond, either for cash or on the installment plan, will win for himself the name of "slacker," he does not refuse to

pledge himself to purchase untold amounts of stamps and bonds, taking care to parry the question of payment, which down in his heart he has not considered seriously and even has an ill-defined intention of not meeting when due.

Behind this thin badge of dishonor this type of slacker has inspired the faith, praise and admiration of patriotic workers who have devoted much of their time to the solicitation of subscriptions to bonds. Perhaps he can best be compared with the perjurer who, by his false testimony, is the cankerworm to justice in the courts. It is fortunate, at this stage of the war, there are comparatively few of this kind.

Calls for Prompt and Decided Action

In respect to dealing with the slacker, let me say that his little game of evading directly or indirectly the obligations that the war imposes on every citizen should be nipped in the bud, lest the slacker become bolder and his number increase. In my opinion the Government should arouse itself to the full appreciation of the importance of dealing firmly with these men wherever they may be found.

The slacker who fails to meet his obligations in respect to the purchase of War-Savings Stamps and Liberty Bonds should be followed up by an unrelenting and uncompromising collector authorized by the Government to exact the payment pledged. The mine official who canvassed the employees of his company, in the drive, should not cease his service to Uncle Sam until each man has redeemed his pledge. He should keep a delinquent in mind of his deferred payments. It might be better to exact an initial payment of every would-be purchaser of a bond, who would then feel a deeper interest to complete his payments and secure the bond in which he has invested.

W. H. Noone.

Thomas, W. Va.

Hindrances to Coal Production

Letter No. 1—I have followed with interest the discussion of the many questions bearing on the production of coal, which is a most vital subject at the present time. Attention has been drawn, by the different writers, to various things that interfere with the regular working of the mines. In the same connection, I want to set forth a few of the hindrances that have impressed themselves on my mind as matters that should be regulated.

In the first place, I want to say that, in my opinion, there is no shortage of mine labor, today, that would warrant the assumption that the mines cannot produce the coal the country demands. I believe a more serious hindrance to coal production is the lack of railroad cars at the mines.

Car supply is a question that the Government must solve if there is to be no coal shortage next winter. Adequate coal production means the prompt loading of cars at the mines. Further, to enable each mine to operate to its full capacity, the cars when loaded must be shipped to market, unloaded, and returned promptly to the mines.

Another hindrance to the work of the miners, which is of quite a different nature, is that presented by the various show attractions, which draw numbers of good miners from their work in the mine. Only the past week a carnival was held in one of the largest towns in this section, with the result that not less than 300 men absented themselves from the mines where they should have been loading 8 and 10 tons of coal apiece each day.

The previous week the mines ran full time and made a record output, while this week all have been forced to run shorthanded, which has greatly reduced the tonnage in this section. The comparison shows the evil effect of permitting frequent shows and other attractions that interfere with the regular working of mines. It would seem to be a matter that should receive the serious consideration of the Fuel Administration.

Referring to the draft and the suggested claims of exemption for coal miners, let me say that I am in the draft myself and expect to be called soon; but another good fellow, perhaps one who is unfit for military service, will take my place in the mine, where he will serve his country as well and as truly as at the front. The call to the colors must consider no one *class* of men as being exempt because they are in that class. The duty of every living soul is to win the war and to serve in the place for which each is best fitted.

Reasons Why There Should Be No Class Exemption for Coal Miners

While exemption for coal miners would affect me, I am not in favor of an order exempting miners as a class. My reason is that there are many men now in the mines who are wholly unfit for and unacquainted with mining work. Under a ruling exempting all coal miners, others would flock to the mines to secure the desired exemption from the draft law.

Let me urge, here, that the administration of the draft should be such that every man will be compelled to answer the call and fill the place where he can best serve. There are men now in the deferred class as being able miners and who, yet, do not work regularly as they should. As a coal miner, I favor any ruling that will assist the work in the mines; but, first of all, I am an American.

Before closing, allow me to mention one other matter observed in this section of our state, which it is to be hoped is not to be found in other states. Here, it has always been the custom for a county assessor to list all the property in the county. This year, the authorities have seen fit, in the interest of economy (?), to cut out the expense of employing an assessor. Every man owning property is compelled to go personally to the county seat and arrange for the assessment of his property and his personal taxes.

The effect of this ruling on the coal production of the county is evident and by no means inconsiderable. A man must absent himself from the mine for a day and possibly two days, in order to go to the county seat and arrange his matters. Others, who are only too willing to avail themselves of any excuse, absent themselves from the mine where they should be loading coal and, perhaps, take much more time to transact their business than would be required if they were more industrious.

The question arises, and may well be asked, whether there is any economy to the country at large, in this

saving to the county the expense of employing an assessor. Again, is the state performing its whole duty to the country by adopting such a system? This, also, is a matter that should receive the attention of the Fuel Administration. I believe the Government should appoint inspectors to investigate not only cases where miners absent themselves from the mines, but such matters as interfere with the working of every mine to its full capacity. OSTEL BULLOCK.

Cleaton, Ky.

The Miner and His Pleasure

Letter No. 2—I have read with deep interest the many letters regarding the miner's relation to the war, particularly the letter of Thomas Hogarth, *Coal Age*, Aug. 15, p. 329, in which he states that the miner "needs all the pleasure he can get." Like Mr. Hogarth, I feel that there is no class of industrial workers who are more entitled to the pleasures of life than the coal miner, so long as he does not allow them to hinder him from attending to his daily work, which is so important at the present time.

It is a pleasure to observe that many mine owners and operators enjoy nothing more than to see their workmen partaking of the same pleasures that are theirs. It is true that, in some districts, there are those who regard the miner and his family as requiring no time for recreation and pleasure. However, these are the exception, rather than the rule. In my opinion, there is nothing more essential to the successful operation of a mine than that the workers shall be given the opportunity to enjoy the pleasures of life. I believe the day has passed when men can be forced to work for a mere living.

It was not long ago that I heard a general manager, in addressing his men at one of their meetings, say that he was proud to see so many of his miners holding $500 Liberty Bonds, and he only wished that he knew how to enable them to buy many more. Expressions of that kind are often the means of tiding a company over a time when labor is scarce. When a company values a man for what he is worth, there is always someone ready to fill the vacancies as they occur, and the ranks of that company are seldom depleted.

COMPARING CONDITIONS IN TWO MINING CAMPS

Compare, for a moment, the conditions in two mining camps, in one of which many of the miners have been able to saye a few hundred dollars with which they have bought their homes, and are still laying by something in store for the future. Compare, I say, this condition with that in a camp where hard working miners have been able to lay nothing by, not even enough to educate their children, to say nothing of buying a home.

In the former instance, the children as they grow up stay at home, and the reputation of the place is such as to draw the best class of miners to its vicinity. In the second instance, few of the children, as they become grown, care to remain where their fathers have done so miserably. The place runs down rapidly, and the mines have difficulty in holding their men or securing others to fill the places made vacant by their leaving.

The day is fast passing, I am glad to say, when the mining classes are regarded solely as a means of contributing to the wealth of their employers, and are restricted in their rights to the full enjoyment of life. The cases are rare, now, where the miner is compelled to trade at the company store and to live in a company house, in order to secure the favor of petty bosses and obtain a good working place in the mine and other privileges that it is in the power of the boss to grant.

Welfare work among miners has emphasized the fact that they can and do appreciate the efforts of honest officials in their behalf. Where the miner can take his family out to see some enjoyment after his day's work is completed, he is more satisfied and will do better work the following day for his season of recreation. On the other hand, where no such privileges are at hand who can blame the miner for becoming discouraged, and when in that frame of mind the saloon often proves too strong a temptation for him. The result is that he goes home late and the morning finds him unfitted for his work in the mine.

While these considerations appear to many to be small and of minor importance, they are great and, perhaps, the *greatest* factors in the successful operation of the mines and increasing the production of coal to meet the present demand. Let me say that it is up to all of us, who are a part of the official family of the company who employs us, to make every effort to increase the pleasures and enjoyment of the miner. Let us regard him as on an equality with that of any other industrial worker. By this means will the production of the mine be increased and the living conditions of mine workers be made better. JOSEPH R. THOMAS.

Plymouth, Penn.

Intemperance Hampers Production

Letter No. 1—Referring to the Foreword in *Coal Age*, Aug. 15, p. 297, by R. Dawson Hall, on the subject of intemperance in its relation to the production of coal, permit me to say that while the main issue presented by Mr. Hall cannot be refuted—namely, that many of the miners in the anthracite region are prone to go on a more or less prolonged spree just after every payday—it occurs to me that the greatest harm to the anthracite industry is the steady consumption of poor whiskey and beer, by the *majority*, I might say, of the miners in that region.

While in the vicinity of Scranton, about two weeks ago, I observed some 200 or 300 able-bodied men whose appearance proved that they worked in the mine and who were loitering on the sidewalks, in the vicinity of a number of saloons. Within these saloons and hidden from the observer were, undoubtedly, an equal number of men who should have been at work in the mine.

The particular day in question was not an off day, but one when the mines should have been running at their full capacity if it had not been for the number of men out of their places. The car supply, at the time, was all that could be desired. I cannot say, now, as my recollection does not serve me, whether a payday had just occurred or not; but I know from my observations that these men were the victims of the lure of the occasional drink in the saloon, probably six or eight drinks a day.

While it may prove a difficult proposition to enforce absolute prohibition in the anthracite region, I certainly

agree with Mr. Hall's suggestion, in reference to restricting the hours in which the saloons can ply their deadly trade. It is my opinion that this should be done at the earliest possible moment and that mine operators should get squarely behind their state governments or their county judges and insist, in the cause of humanity, that the hours in which saloons may remain open be greatly reduced.

On the occasion of numerous other trips into the anthracite region, I have observed the same conditions and believe that they must prevail constantly. Medical authorities agree that alcoholic drinks of any kind, whether they contain a large or a small percentage of alcohol, if consumed freely will do more harm to a man than will an occasional debauch.

The result is that the efficiency of the miners, wherever liquor in any form is sold, is severely handicapped. Intemperance on the part of coal miners helps to prolong the period of German atrocities, and every miner, mine official, banker, merchant, clerk and farmer should coöperate to the fullest extent of his ability in getting the Huns and bringing this terrible war to a close.

Philadelphia, Penn. OBSERVER.

The Wagon Mine a Menace

Letter No. 2—Kindly permit me to refer to the letter of H. E. Gray, *Coal Age*, Aug. 8, p. 282, and to say that my experience convinces me that wagon mines are not the menace to the coal industry that Mr. Gray claims. In his letter he likens the enormous growth of smaller mines to that of a "gigantic cancer that is slowly but surely sapping the vitality of the industry." On the contrary, to my mind the growth of the smaller mines is a blessing and should be encouraged, particularly at the present time.

Notwithstanding the fact that every coal miner and operator is being urged, today, to do his utmost to increase the output of coal, and every paper and magazine voices the same sentiment to avoid the shortage in the fuel supply next winter, Mr. Gray would have us close down the small mines. Not only does he charge them with being unsafe and unsanitary, but seems to regard them as the source of the impure coal that has been shipped to market as fuel. Let me remind him, here, that every ton of coal produced, whether from a large or a small mine helps to win the war.

CHARGED WITH SHIPPING IMPURE COAL AND LACK OF SANITATION

In regard to the shipment of impure coal, the charge will apply equally to both classes of mines. While it is true that there have been *hundreds* of tons of impure coal dumped on the market, the output of small mines, there have been *thousands* of the same kind of material loaded for market by the large mines. My observation leads me to state that the purity of the output of wagon mines, or "country banks," as they are often called, compares favorably with that of large operations. In the small mine the owner visits every man's working place, each day, and pays particular attention to the loading of clean coal. The miner who is caught loading dirt with his coal is first reprimanded and, if the offense is repeated, he is docked, which is the same penalty as is applied at the larger mines.

Allowing that the equipment for screening and preparing the various sizes of coal is not as complete in the small as in the larger mines, let me ask if the proper sizing of the coal necessarily means cleaner coal. At the country bank the coal coming from the mine is dumped on a platform. Most of this coal is sold for domestic use. The teamster pays close attention to what he loads into his wagon, knowing well that if he takes a load of dirty coal to a customer he will stand a good chance of losing him. This does not apply with the same force to the coal loaded at the larger mines.

In respect to safety and sanitation, I believe that small mines compare favorably with large ones. In the former the ventilation does not have as far to travel and there is generally better air at the working face than in many larger mines where the air current is heavily ladened with smoke and gases. If a person travels a few of the air-courses in many of these larger mines he will be convinced that there is ample room for improvement, both in respect to safety and sanitation.

Again, in the small mine, the miner has less difficulty in securing promptly his needed supplies, which are often brought to him by the next trip into the mine, while in large mines the miner must often wait a day or more and work under bad top until he gets the needed timber to make his place safe. Speaking of safety, it is a fact that miners often leave the larger operations for work in a smaller mine, for reasons of safety only. Reference to the coal report of Illinois will prove that a much larger percentage of accidents happen in the larger than in the smaller mines in that state.

GOVERNMENT INSPECTION OF SMALL MINES IN ILLINOIS

In speaking of Government regulations, Mr. Gray seems to imply that the mining law is not enforced in respect to small mines, which is not the case in Illinois, where the state mine inspectors see that the provisions of the mining law, in respect to ventilation, drainage, shotfiring, etc., are obeyed in large and small mines alike. Old miners often prefer to work in small mines because they are afraid to travel the haulage road in the larger mines, where they must continually seek safety in refuge holes to avoid motor trips.

Finally, another reason for encouraging the smaller mines is that they enable the poor to get coal, when they would be unable to pay the price asked by the middleman or dealer, who must have his profit for handling the product. This is not to say, however, that small operators are cutting the price, which is the same at the small mines as at the large mines; but the output of the former is sold direct to the consumer and escapes the profit made by the middleman.

In closing, let me say that many of our present-day operators would still be digging coal had it not been for the start they got in operating a small mine. I know several such personally who are today among our largest operators. Why then rob the man of limited means of this opportunity to rise and improve his condition?

Moreover, the closing of the small mines would result in hundreds of acres of coal being lost, because the property would not warrant installing a large equipment, or the coal is thin and may lie too far from the railroad to permit of its coming into successful competition with other coal in the same market.

West Frankfort, Ill. GEORGE BOWKER.

INQUIRIES OF GENERAL INTEREST

Improved Coal Equipment

As a student of the University of Southern California, I have been an interested reader of *Coal Age*, which has been helpful to me in my investigation of coal-mining methods and equipment in the United States. At present, I am seeking information in regard to the most improved methods of burning coal, in the production of *power*, and the most up-to-date equipment for loading coal, both in the mine and for shipment. I understand there have been rapid strides made recently in these respects. Unfortunately, I have found there is little information generally available along the lines, which leads me to ask *Coal Age* and its readers the following questions: 1. What are the names of engines that use a powdered coal? 2. What is the most up-to-date coal-loading machine used in this country? 3. Kindly explain the utility of forwarding coal by compressed air.

Los Angeles, Calif. G. HOSOVO.

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1. This question may refer to an internal-combustion engine, using gas or some form of liquid fuel. The answer to that question is: No attempt to utilize powdered coal as fuel, in an internal-combustion engine, has proved successful, owing to the difficulty of eliminating the ash resulting from the combustion of this fuel in the cylinder.

On the other hand, the question may refer to the railroads that have successfully used powdered coal as fuel for their locomotives. In answer to that question, we would refer the correspondent to the Report of the Committee on Pulverized Coal, as published in the proceedings of the Chicago meeting (1917) of the International Railway Fuel Association. The report of the committee gives a brief résumé of the fuel situation at that time (May, 1917), and emphasizes the growing need of fuel economy. It states that "the burning of pulverized fuel in suspension in the locomotive firebox has passed beyond the experimental stage."

The principal railroads using this fuel in one or more of their locomotives are the following: Delaware & Hudson; New York Central; Chicago & Northwestern; Missouri, Kansas & Texas; and Atchison, Topeka & Santa Fé. This report of the committee to which we have referred was widely discussed by the railroad officials present, and their comments and suggestions afford much valuable information on the subject.

2. A machine has recently been designed by the Jeffrey Manufacturing Co., Columbus, Ohio, for loading coal at the working face in a mine. This machine, which was described in *Coal Age*, July 20, p. 104, is both light and portable and its use has demonstrated the fact that two men can load from 50 to 80 tons of coal in an eight-hour shift, depending on the conditions existing in the mine. In seams where this device can be employed, it will undoubtedly largely increase the tonnage per man. As far as our knowledge goes, this is the only machine designed for this purpose.

In regard to loading coal on the surface, whether in bins, railroad flats, box cars or ships, there are numerous types and kinds of machines employed and it would be difficult to say which of them is the most up-to-date. A loading machine must be always adapted to the particular conditions under which it is required to operate, in order to secure the best results and the highest efficiency. A machine that would give excellent results in the handling and loading of anthracite would, perhaps, prove an absolute failure when employed to load soft coal. It is necessary, therefore, to study carefully both the nature of the material to be loaded and other conditions that must be met.

3. It is difficult to understand to what particular operation in the coal industry this question refers. About 1910 the United States Coal and Coke Co. experimented at one of their mines, Gary, W. Va., with a scheme for transporting coal from the working face to the tipple by what might be styled a "compressed-air system," but which was, in fact, an exhaust or vacuum system.

The scheme contemplated consisted of a pipe line extending from a hopper at the working face, through the mine entries to the surface, where a Root blower was located whose operation produced a strong depression or suction in the pipe line. The coal was mined and broken into fragments by a machine at the face and delivered to the hopper. The suction produced by the blower was such as to draw large lumps of coal through the pipe to the suction head, where the action of gravity separated it from the air and it fell into the chute.

We understand that, later, the same company drove a length of entry that was to be especially adapted to the scheme of transporting coal in this manner to the surface. But thus far there has been no application of the method in practice.

Calculation of Sines, Cosines, Etc.

We are often asked questions, in examination, that require the use of sines, cosines, and tangents. In many cases, the values of these functions are not given, and the candidates are not permitted to bring books or tables to the examination. Can you give me a formula for calculating the natural sine, cosine or tangent, for any given angle? Those whom I have asked seem to be unable to give me a satisfactory answer.

Divernon, Ill. STUDENT.

This question was asked some time since and was answered quite fully in *Coal Age*, Vol. 5, p. 102.

Whenever the answer to a question requires the use of a sine, cosine or tangent, the examining board should either give the required value, or permit candidates to use tables and textbooks. *Coal Age* has always urged that the examination is more practical when candidates have the same access to books in a technical session as they have in practice.

EXAMINATION QUESTIONS

Miscellaneous Questions

(Answered by Request)

Ques.—A gangway is being driven in the Skidmore vein, which has a dividing slate 2 ft. thick; the bottom bench of coal is 3 ft. thick and the top coal 1 ft. thick. How would you proceed with the work in regard to safety? The pitch of the vein is 25 deg.

Ans.—Experience in the mining of this coal and a knowledge of the conditions must alone dictate the safest method to pursue. The general plan to be advised, however, would be to mine a safe distance in the bottom bench of coal which is 3 ft. in thickness. Before doing this, it may be necessary to sprag the dividing slate to give it the needed support while dropping the lower bench of coal. When this coal has been removed, the dividing slate can be dropped by wedging or blasting, after which the upper bench of coal is taken down.

A better knowledge of the character of the underlying and overlying strata will determine whether it will be better to lift bottom on the high side of the gangway or to break the roof on the low side.

Ques.—What safety appliances should be kept and maintained at the surface landings where miners are being lowered into and hoisted out of a mine?

Ans.—Such landing should be protected by safety gates operated by the movement of the cage in the shaft and which are always closed except when the cage is at the landing. The landings should also be protected by safety blocks and derailing switches to prevent cars from running into the shaft. The cage, in addition to automatic safety catches and devices for the prevention of overwinding, should have a hood.

Ques.—In case you should find the water very low in a boiler, what would you do?

Ans.—When the water level in a boiler has fallen below the lower gage-cock, there would be extreme danger in feeding more water into a boiler. At once, throw open the furnace doors and bank the fire, using for that purpose ashes or moist earth, if immediately available. Otherwise, cover the surface of the fire with fresh coal, taking care not to disturb the bed of coals, which would increase the heat of the fire. Avoid disturbing the safety valve, as the sudden escape of steam from the boiler might cause the water remaining in the boiler to vaporize suddenly. Having banked the fire, allow the pressure to drop and the boiler to cool before making any attempt to fill the boiler.

Ques.—Find the piston area of an engine delivering 50 theoretical horsepower, when the stroke is 3 ft. long, the mean effective pressure 30 lb. per sq. in., when the engine is making 30 strokes per minute.

Ans.—50 theoretical horsepower is equivalent to $50 \times 33{,}000 = 1{,}650{,}000$ ft.-lb. per min. Since the length of stroke is 3 ft., and the engine is making 20 strokes per min., the piston speed is $3 \times 20 = 60$ ft. per min.; and the total pressure on the piston, in that case, is $1{,}650{,}000 \div 60 = 27{,}500$ lb. Again, the mean effective pressure in the cylinder being 30 lb. per sq.in., the area of the piston is $27{,}500 \div 30 = 916\frac{2}{3}$ sq.in.

Ques.—Explain fully the essential points in building and erecting mine doors.

Ans.—A mine door should be hung so as to close with the air current and should be given a slight fall so that it will not stand open unless it is propped back or held open. The door should be made of double boards cut on the bias and nailed together firmly to resist sagging. It should be hung in a substantial frame that will not be readily displaced by any ordinary jar. Canvas flaps should be nailed to the edges of the door in such a way as to prevent the leakage of air. Mine doors should never be located at the foot of a grade. Whenever a door requires an attendant, a refuge hole should be cut in the rib to protect him from accident.

Ques.—If you found one split passing more than its share of air, how would you remedy the defect?

Ans.—If a foreman finds the quantity short in one district while another district is receiving more than its requirement, the quantity is regulated by changing the regulator door, or moving the slide in a box regulator, until the desired proportion of air is obtained.

Ques.—When two kinds of powder are used in the same hole, what is likely to be the result?

Ans.—It may be assumed that the two kinds of powder have a different rate of burning, or in other words, one is quicker than the other, in which case the slower powder will be blown from the hole by the explosion of the quicker one. The slower powder being exploded on the air produces a windy shot, which is always dangerous, in coal mining, because of the cloud of dust that it raises. If a second shot follows the first, its flame will be projected into this dust cloud and cause the ignition of the dust, producing a local dust explosion.

Ques.—What conditions make the use of permissible explosives necessary in a mine, and why are they safer than black powder?

Ans.—The generation of gas in considerable quantities at the working face in a mine should make the use of permissible powders advisable if not necessary. Also, such powders should be used in a mine where the coal is highly inflammable and much fine dust is produced. In many mines where these conditions do not prevail, however, a permissible powder will be found to give better results than black powder and should be used because of its greater economy.

Permissible powders are always safer than black powder, in blasting coal, because they produce less flame when exploded. The charge of a permissible powder is limited to $1\frac{1}{2}$ lb., whereby the excessive use of powder by the miner is prevented. When a greater charge is used, th powder ceases to be permissible. A permissible powder is fired by a detonator, thus avoiding the use of fuse or squibs.

COAL AND COKE NEWS

Harrisburg, Penn.

Provost Marshal General Crowder, through Adjutant General Murdock, of the State Department, has overruled the opinion of George R. Stevenson, of Scranton, chairman of the district board covering the anthracite counties, relative to the latter's decision on deferred classification for men employed in and about the coal mines. General Murdock has sent a circular letter to all local draft boards in the matter, in which he quotes abstracts of Stevenson's letter, and does not mince matters in saying that the findings are not correct and that Stevenson has no business anyway in making rulings, that this work is up to the State Department, and that the statements made are "improper" and "unauthorized." Mr. Stevenson resigned his position as Chairman on Aug. 30.

Flotation among coal companies of a loan of almost $1,000,000 to the Luzerne County Gas and Electric Co., and linking together in one huge system of all the electric power-generating plants of the Wyoming coal fields, was planned at a meeting held at Wilkes-Barre on Aug. 28. Present at the session was the head of every coal company from Forest City to Shickshinny, the manager of every power company, public or private, and E. C. Cole, Pennsylvania state director of conservation for the Fuel Administration; G. R. Henderson, administrative engineer of the Fuel Administration, and other engineers connected with the Government.

The meeting, called at the instance of the National Fuel Administration, had the purpose of finding some means of alleviating a power shortage which is being acutely felt in the coal regions. The shortage is made more menacing because at this time it is practically impossible to secure machinery or parts for repairs and enlargements. It is because of this fact that the loan to the Luzerne County Gas and Electric Co., which supplies current for power and light to the greater part of the valley, was projected. This company has the materials either on hand or in course of construction which would make possible a great extension of its capacity. But, like other public utilities the country over, states Mr. Henderson, the Luzerne company finds it practically impossible to secure in the open market the funds necessary for this extension.

The matter of financing the Luzerne County Electric Co., however, remains unsettled, the coal companies showing no great enthusiasm for such investment. A committee of engineers from the various coal companies and the engineers of the electric companies are making an investigation of the entire proposition, and the matter will come up for final settlement at a meeting to be headed by Charles F. Huber, president of the Lehigh and Wilkes-Barre, who will be the spokesman for the coal companies.

Uniontown, Penn.

The program of the Production Department of the Connellsville regional fuel administration calls for a weekly output of 800,000 tons of coal, according to an announcement made by Production Manager W. L. Byers, who is now shaping up details for a "fuel drive" by which it is hoped to increase the region's production the necessary 15 per cent. to realize that goal.

As the opening shot in the production stimulating campaign a message from Charles M. Schwab, director general of the Emergency Fleet Corporation, and one of the dominating figures in the steel and iron trade, was circulated among the coal and coke workers. In that statement Mr. Schwab declared that "the miner who puts in a full day six days in the week is a true patriot and entitled to every credit." He says that "coal miners are doing very necessary and patriotic work, as without coal ships are useless," and that "they should be encouraged, therefore, to strive in every way to produce the maximum tonnage to keep up with the ever-increasing demand."

To pound home to the workers the necessity for full time in the mines and coke yards Production Manager Byers in a statement to the workers in connection with Mr. Schwab's statement declared that "the amount of coal loaded by one miner in one day, if burned in byproduct ovens, will produce enough of the best explosive to charge 160 three-inch shells and make enough coke to produce steel to make 2000 of the shells themselves."

Mild weather and a better car supply worked hand in hand this week with the patriotic coke workers to increase the production, which has dragged for several weeks. The car situation now has been solved, and the region is getting better than an average of 80 per cent. cars. On one day last week the Pennsylvania R. R. placed 100 per cent. cars both for coal and coke loading.

While there was a slight increase in coke production, two holidays and booze consumed following the semi-monthly holiday were factors in preventing a greater increase. The local fuel administration is now working on the liquor problem as it affects the region, but action must necessarily be restricted because of the limited authority on that subject.

Reports are current in both the coal trade and in railroad circles that an order will be issued shortly by Director General McAdoo diverting a goodly portion of coal shipments originating in the Fairmont region from the Baltimore & Ohio R. R. to the lines of the Monongahela R. R. By that arrangement the coal will come down the Monongahela Valley to Fayette City and over the Whitsett Junction branch, connecting with the Western Maryland lines to the seaboard. The advantage of diverting the heavy coal shipments would be to dodge the heavy grades between Uniontown and Morgantown on the Baltimore & Ohio.

Birmingham, Ala.

Despite an improvement in transportation conditions in the Birmingham district the coal output for this section is running short of expectations. Mine-output statistics, however, might be regarded as encouraging, and with better freight-car service from the mines production is expected to show up more satisfactorily.

Coal produced for the past four weeks, according to Government statistics compiled here, is on a basis of 22,000,000 tons a year, which will place 1918 production over that for 1917. The latest official statistics, however, show a most pronounced slump in output. There is a difference of 16,683 tons in the production for the week ending Aug. 17 as compared with the week ending Aug. 10. During the week of Aug. 17 the tonnage totaled 411,035 tons, as against 437,718 tons for the preceding week.

The general situation in the coke field is relatively unchanged, with production at about 90 per cent. of maximum. The coke producers are doing their utmost with the ovens available. All development work in this particular field is being rushed. A casual survey of the general situation, both as regards coal and coke production, shows that in Alabama fuel administration officials are directing production so that the output both at ovens and mines will go to essential industries, to meet the demands of domestic consumers and keep nonessentials from drawing supplies needed elsewhere.

Charleston, W. Va.

Coal production in West Virginia suffered a drop during August because operations were without a supply of cars commensurate to the capacity of the mines. Some districts not heretofore affected suffered from a poor supply, during the last week of the month, the New River District being an instance. There was almost a paralysis in the Kanawha district, where nearly half the mines were shut down, throwing 2800 miners out of work. In other words, 62 out of 132 mines were unable to operate, having no cars. What with a strike in one mine, numerous funerals and the poor car supply, there was mined in the New River district during the week ending Aug. 24, 7548 tons less than during the preceding week; or, in other words, 161,870 tons one week and 169,418 tons the other week. Indifference among miners as to whether they worked or not entailed further losses in the New River district. The percentage of miners not working in some of the mines is running as high as 30 to every 100 miners employed, or approximately 33⅓ per cent. The figures given for production cover the production of 66 out of 71 mines reporting. In the opinion of T. L. Lewis, Secretary of the New River Association, there is room for at least an increase of 20 per cent. in the output without any additional miners being required.

Though contiguous to the New River district, the Winding Gulf district, in the same period that the former region was falling behind, was able to forge ahead in the quantity of coal produced. The increase in the Winding Gulf section amounted to 15 per cent., which is regarded as a most gratifying increase in view of the fact that adjacent districts fell behind.

For the last week or so production has been virtually at a standstill in the Tug River and Pocahontas districts in so far as any increase or decrease is shown. There has been a gain but this was so small as to depress the operators, who know just what could be done under more propitious circumstances. While the car supply showed a decrease of 25 cars, there was on the other hand an increase in the number of hours worked. Miners working 7315 hours produced 437,546 tons. Mine disability resulted in a loss of 6823 tons. In the two districts combined the total production of coke was 43,330 tons for the week.

Cars furnished the Fairmont district during the last week of August were still short of requirements. As 1800 cars on an average are needed to keep all the mines in the district busy, the 1429 cars furnished early in the week were inadequate for all the mines. According to the best information obtainable 7500 more cars could easily have been used last week for loading coal out if these had been placed earlier. Though managing to secure a change in the regulations prohibiting the shipment of coal to New England points in box cars, the team track operators in the Fairmont district are now confronted with another difficulty—they cannot get cars of any description. According to statistics compiled, the Fairmont district needs nearly 1300 more miners.

Though regarded as a part of the Fairmont district, mines in Randolph County and along the Coal & Coke Ry. are not supplied from the cars allotted to that district. The mines in Randolph receive their cars from the Western Maryland, the Western Maryland having taken over the operating of the Belington and Coalton branches of the Coal & Coke.

Dallas, Tex.

Attention of large industrial concerns is being directed to the vast beds of lignite in eastern and northeastern Texas, and many large concerns have already made plans for erecting additions to their plants or instituting the necessary changes for using lignite as fuel instead of coal. Announcement has been made by the United Verde Extension Co. of Jerome, Ariz., that its reverberatory furnaces and boilers of its smelters can be operated successfully and economically by using ordinary lignite in a finely powdered form for fuel, but using this under strong air pressure. The Texas Light and Power Co., which furnishes electric current for numerous cities and towns in all parts of Texas, has stated that it will erect its central power plant on the lignite beds near Rockdale, Texas, from which current will be distributed over high tension lines. These and other developments in Texas at this time point to a greatly increased use of lignite for fuel. There is an unlimited supply of lignite and iron ore in Cass and Bowie Counties, in northeastern Texas, and steps are now being taken toward organizing a company which will erect a furnace and develop the vast iron ore beds, using lignite as fuel. Unlimited deposits of limestone and cement rock can be had from White Cliffs, Ark., 20 miles north of Texarkana, and as the iron ore and lignite beds lie about a like

distance south and southwest of that city, it is proposed to erect the furnace in the vicinity of Texarkana, or nearer the ore beds, so that long hauls may be eliminated.

PENNSYLVANIA

Bituminous

St. Mary's—Owing to car shortage on the Pittsburgh, Shawmut & Northern R.R., approximately 1000 miners are idle and as a consequence the loss in coal tonnage will be in excess of 4000 tons daily. The Pittsburgh, Shawmut & Northern R.R. owns 2500 coal cars, but under the car-pooling system these cars have been diverted to all parts of the country. The Shawmut is not a Government controlled road, and for this reason the operations along its lines are handicapped. The miners and coal operators are much discouraged over conditions.

Uniontown—Development of the Elliott coal field, located along the Monongahela River near Fayette City, has been commenced following the consummation of a $1,000,000 transfer. The tract, for which many prominent operators have endeavored to acquire title, was purchased by Julian Kennedy, of Pittsburgh, and R. C. Crawford, of McKeesport, for a consideration said to be $2500 per acre. Involved in the deal also was the surface of an adjoining farm and right-of-way for a tramroad over several other farms to the river. The development of the tract is being done by the Lowler Gas Coal Co., in which Kennedy and Crawford are reputed to be interested. The plotting of a town has already been laid out and 75 dwellings for the employees will be erected.

Anthracite

Mount Carmel—The Lehigh Valley Coal Co. has completed a new electric washery at Centralia, which will have a daily capacity of 1200 tons.

Hecla—Hecla is a poor place for slackers to hold out in. Seventy-three sympathizers were arrested for attempting to cripple the coke-making business of the village. Four Austrians, who declared they would work only when they felt so disposed, were also arrested.

Mount Carmel—To have been terribly roasted after he had been burned in an explosion of gas was the experience of Joseph Corbett, 43, a miner at the Reading Coal and Iron Co.'s Reliance colliery. Corbett was at work in a breast and ignited a body of gas with a naked lamp. The explosion set fire to his clothing and he was roasted to death. His fellow workmen, Adam Moran, was also badly burned.

Pottsville—The Harleigh-Brookwood Coal Co. has commenced operations for the reconstruction of its coal breaker near Hazleton recently destroyed by fire, with loss estimated at approximately $200,000. The proposed new structure will be of steel construction, to have a capacity of 1000 tons daily. At the present time the company's mines at this point produce about 500 tons per day, and it is said that plans are under consideration for an extensive increase in this output.

Pottsville—Production of coal is not being curtailed in order to force an increase in wages of miners, nor will the miners resort to such unpatriotic devices, declared leaders in this section. The miners declare they feel virtually certain of an increase, and say the only manner in which the coal production will be affected, if an increase of wages is not granted, is that many miners will leave for other occupations.

Hazleton—Announcement is made by the Lehigh Valley Coal Co. that the Buck Mountain workings, which have been abandoned four times as being worked out, are to be reclaimed. It is hoped to obtain thousands of tons of anthracite from the culm dumps.

ALABAMA

Haleyville—The Glen Mary Coal Co. has acquired the extensive coal properties near Delmar, Winston County, owned and operated by Mrs. Mary A. Gamble and sons, comprising approximately 440 acres. It is understood that the new owner is planning for the early operation of the plant.

Birmingham—The Champion Coal Co., recently incorporated with a capital of $20,000, is planning for immediate development work on 600 acres of coal properties acquired in the Boaz district. It is expected to have an initial capacity of about 300 tons daily. W. C. Rust, of Birmingham, is president and manager.

WEST VIRGINIA

Bluefield—In an explosion in a powder magazine owned jointy by the War Creek and Johns Branch Coal companies, two men, whose names could not be secured, were killed last Friday. They attempted to knock the top off a barrel of powder with a pick, while inside the magazine. A spark from the pick set off the power. An explosion followed, the detonation from which could be heard for many miles around.

Whitesville.—The Mordue Collieries Co. is preparing to begin the mining and shipment of coal from the mines it has just opened in the Coalburg seam, where coal will be taken from a 14 ft. seam. The company is under the management of C. L. Allen.

Carbondale—By installing new equipment at Carbondale, where it has acquired the No. 6 plant, the W. P. Price Mining Co., a Dayton concern, expect by the middle of next month to be in a position to ship coal on a large scale.

Ansted.—Operations have been resumed at the Hawk's Nest plant of the Mill Creek Coal Co. which was put out of commission early in the spring by a flood. Then general manager of the company is W. H. Evans, of this place.

Clarksburg—The Mt. Clare Collieries Co. has arranged for motor haulage at its Mt. Clare plant, and at the same time will make other improvements.

The Thermal Coal Co. has extended its operations at Lost Creek by opening another mine there, coal being taken from the Red Stone seam. The company will open two more mines in the same vicinity, where coal will be mined from the Pittsburgh seam. A fan has been installed at the company's No. 2 mine and many dwellings for miners have been erected.

Bazel—In addition to adding many new mine cars to its equipment, the Fort Clark Coal Co., at its plant here, is also installing fans, having driven a 600-ft. airway through the coal. The superintendent of the company is D. F. Gandy.

Fairmont—The old Aurora mine near here has been acquired by Clarence Robinson, of this city, preparatory to resuming operations there. A number of improvements will be made with a view to getting the mine ready to produce a fairly large tonnage, these improvements being made under the direction of Doney Pople. Within a very few weeks Mr. Robinson expects to have the mine in operation.

The reopening of Mine No. 7 of the Jamison Coal Co. this week near this city was rather a noteworthy event in coal circles. Foollowing an explosion two years ago a fire started in the mine, which has been out of commission since then. Sam McMann started the work of reopening the mine and lost his life in doing so. J. C. Davis, ex-chief mine inspector of Ohio, and J. C. McDermott, chief inspector of the Jamison mines in Pennsylvania, were also called into consultation together with W. J. Heatherman, present chief of the West Virginia Department of Mines, who finally gave his approval to the reopening of the mine, delegating District Inspector Reggle-men to supervise the work. Two fans—a Robinson and a Clifford—have been installed, and a new ventilating system provided for. An inspection of the mine has revealed that there had been three fires burning after the explosion. Sixty steel cars a day was the capacity of the mine before it was put out of commission.

Elkins—While the West Virginia Coal and Coke Co. expects to open another mine at its Norton operation, above the present mine, the company instead of changing the present siding leading to the mine now in operation, which would necessitate a heavy outlay, will build a tramway from the opening of the new mine to the tipple of the older mine, where the coal will be run over the tipple. The West Virginia Coal and Coke Co. is now loading out on an average of 35 cars of coal a day.

OHIO

Nelsonville—The Standard Coal Co., of which D. F. Shafer is the head, is opening another mine near Nelsonville on the Hocking Valley Ry. It will be the third opening in that immediate vicinity. It is a drift mine into No. 7 seam. The company is now loading 50 tons daily, which will soon be increased to 200 tons. The new mine will develop a tract of 97 acres.

Moxahala—The Roberts Coal Co., Columbus, will soon open a new mine on the Toledo & Ohio Central in a tract of 100 acres, part of which is owned in fee simple and the other controlled by lease. It is No. 6 seam. The work of driving entries has started and a tipple will be erected. It is expected to produce 200 tons daily in about four months. Leo L. Roberts is at the head of the concern.

INDIANA

Sullivan—The residents of Carlisle, Ind., have petitioned the Indiana Public Service Commission to compel the Chicago-Carlisle Coal Co., which operates a mine at Carlisle, to sell coal to the wagon trade there in order to assure a supply of fuel locally for the coming winter.

Terre Haute—Production of coal in the Indiana field for the week ended Aug. 17 was below normal, according to reports made by mine operators to the Federal Fuel Administration. The 204 mines hoisted 399,315 tons as against 638,830 tons the preceding week. The decrease is due chiefly to car shortage. The annual picnic on Saturday also caused a loss of 24,000 tons. The total loss of time because of labor was 3.94, as against 2.38 per cent. the preceding week. The car shortage for the week was 9.23 per cent. as against 8.34 per cent. for the preceding week. The Pennsylvania had the greatest shortage, it being 21.68 per cent. The Chicago & Eastern Illinois had a shortage of 4.83 and the Chicago, Terre Haute & Southeastern of 9.07 per cent. The Monon road had a shortage of only 1.85 per cent. in serving 21 mines.

ILLINOIS

Carlinville—The first coal in the three new mines being opened near here by the Standard Oil Co. was struck recently in Mine No. 4, just north of the city, at a depth of 295 ft. The shaft was started May 1. It is expected that coal will be hoisted about Oct. 1. The hoisting of the first load will be made an event. It will be auctioned for the Red Cross. The three mines will be among the largest in the world, employing several thousand men. The company is erecting large brick office buildings and 250 one-story houses for the miners. Its power plant at Shoper will have capacity for all the requirements of the three mines and more.

Marion—A new coal-mining town being established by the Old Ben Corporation on the border of Franklin and Williamson Counties is to be named Pershing. The company is sinking a shaft for a new 5000-ton mine. It is expected that the vein, 420 ft. down, will be reached and coal hoisted by Dec. 1. Eighty acres has been purchased for the town site.

West Frankfort—Mines Nos. 18 and 19 of the Peabody Coal Co. will soon be equipped with individual electrical units. At Mine No. 19 a 450-kw. generator will be installed, to be connected with Corliss engines. Two new boilers will also be installed. Automatic hoisting cages were installed in this mine during the lull in business this summer. Mine No. 18 will be equipped with the same or a larger generator than Mine No. 19.

Galesburg—B. F. Stanforth has purchased the Davis coal mine from Jesse Hillier, who has been conducting it since 1904.

Duquoin—Evan D. John, Director of Mines and Mining, has announced that an examination for state mine inspector, mine manager, hoisting engineer and mine inspector will be held at Springfield Sept. 10. All applicants for state mine inspector and first-class mine manager must have completed a course in first-aid work at a mine-rescue station.

KENTUCKY

Louisa—The Louisa, Fort Gay Torchlight Coal and Development Co. plans coal land developments at the mouth of Lick Creek, near here. This company was recently organized with C. E. Stafford as president. Its plans provide for opening 10 collieries, building a central power plant and constructing a 10-mile railway.

Whitesburg—The Elkhorn & Jellico Coal Co., recently incorporated with a capital of $500,000, is planning to commence operations at an early date on the development of about 550 acres of coal properties recently leased. The company is planning for the immediate installation of the necessary equipment. M. K. Marlow is president and manager.

Henderson—The Hayes Coal Co. is opening a new mine at Zion, and has fired its first shots. The shaft is 120 ft. deep. The mine so far has proved very dry. The company will build a tipple at once and install equipment to facilitate handling.

OKLAHOMA

Tulsa—J. A. Brantley, of Sand Springs, Okla., expects to start the opening of a coal mine near here some time during the month of September.

Foreign News

Tokio, Japan—Serious disturbances are reported among the miners in the Kyushu coal district. At one colliery the miners set fire to the mine buildings. Fifty houses were destroyed.

Ottawa—The Lignite Utilization Board, which will have charge of the establishment and operation of the plant to be constructed in Saskatchewan for the carbonization and briqueting of lignite coal to produce a domestic fuel, has been appointed. It comprises R. A. Ross, consulting engineer, of Montreal, chairman; J. M. Leamy, of Winnipeg, Man., provincial electrician; and J. A. Sheppard, a leading business man of Moose Jaw, Sask. The cost of the plant is estimated at $400,000, of which the Canadian government will furnish $200,000; Saskatchewan, $100,000; and Manitoba $100,000. The recovery of oil, pitch, ammonia, etc., as byproducts will be an important feature of the undertaking.

Personals

W. J. Freeman, of Terre Haute, Ind., president of the Indiana Coal Operators' Association, and president of the Green Valley Coal Co., has been appointed coal production manager for the Indiana coal district by James B. Neale, director of production for the Federal Fuel Administration at Washington. Mr. Freeman is also a member of the Indiana State Council of Defense.

Coming Meetings

New York State Coal Merchants Association will hold its annual convention Sept. 5-8 at Saratoga, N. Y. Secretary, L. V. Shepard, Elmira, N. Y.

Indiana Retail Coal Merchants Association will hold its annual convention Sept. 25 and 26 at Hotel Severin, Indianapolis, Ind. Secretary, R. R. Yeagley, Logansport, Ind.

National Safety Council will hold its seventh annual safety congress Sept. 16-20 at Hotel Statler, St. Louis, Mo. Secretary, W. H. Cameron, Continental & Commercial Bank Building, Chicago, Ill.

Publications Received

Fuel Facts. United States Fuel Administration, Washington, D. C. Unillustrated, 64 pp.; 6 x 9 inches.

Report of British Columbia Minister of Mines, 1917. Printed by authority of the Legislative Assembly. Illustrated; 557 pp.; 7½ x 10¼ inches.

The Diffusion of Oxygen Through Stored Coal. By S. H. Katz, Department of the Interior; Bureau of Mines. Technical paper 170. Illustrated; 44 pp.; 6 x 9 inches.

Monthly Statement of Coal Mine Fatalities in the United States, April, 1918. Compiled by Albert H. Fay. Department of the Interior: Bureau of Mines. Unillustrated; 21 pp.; 6 x 9 inches.

Analyses of Canadian Fuels; In Five Parts; Part I—The Maritime Provinces. Compiled by Edgar Stansfield, M. Sc., and J. H. H. Nicolls, M. Sc. Bulletin No. 22. Canada: Department of Mines. Unillustrated; 28 pp.; 6½ x 9½ inches.

Trade Catalogs

McGraw-Hill Books. McGraw-Hill Book Co., Inc., 239 W. 39th St., New York. Catalog. Pp. 226; 5¼ x 8¼. This catalog is classified by subjects, is indexed by authors, titles and subjects, and lists the McGraw-Hill engineering, scientific and business books.

Williams Digging Buckets. The G. H. Williams Co., Erie, Penn. Catalog. Pp. 48; 5¼ x 7⅜; illustrated. Lists the Williams clam shell buckets and material handling machinery. Accompanied by a separate data supplement.

Vertical Triplex Power Pumps. Worthington Pump and Machinery Corporation, 115 Broadway, N. Y. Bulletin D-702. Pp. 56; 6 x 9 in.; illustrated. Gives a clear insight into the details of the construction of the Deane of Holyoke triplex power pumps, single and double acting.

Magnet-Operated Brakes for Direct-Current Service. Cutler-Hammer Manufacturing Co., Milwaukee, Wis. Booklet G. Pp. 4; 8½ x 11 in.; illustrated. Makes mention of the operating features of these brakes. Ratings, dimensions, engineering data and the formula for determining the retarding torque required for any brake installation are given.

Westinghouse Instruments and Relays. Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn. Catalog 3-B. Pp. 103; 8½ x 11; illustrated. A departure from the original edition of the same catalog, in that wherever possible each particular type of apparatus is listed on only one page. Where more than one page is required, the several pages necessary are confined to a description and listing of only the one particular type—so that it is very easy to find what one is looking for in this catalog.

Industrial News

Chattanooga, Tenn.—The Such Creek Coal Co. has filed notice of an increase in its capitalization from $50,000 to $200,000, to provide for business extensions.

New York, N. Y.—The Scranton & Wyoming Coal Co., Inc., East River and Thirtieth St., has filed notice of an increase in its capitalization from $100,000 to $190,000, to provide for business extensions.

Washington, D. C.—An examination of the business records of about 265 coal producing companies by experts of the Internal Revenue Bureau has disclosed unreported profits yielding more than $5,000,000 additional tax revenue to the Government.

Providence, Ky.—L. Sornborger & Co. have taken over the mines of the Washington Coal Co. L. Sornborger will be general manager, and Joe Jennings will continue as superintendent. The new company plans enlargement of its capacity and additional holdings.

Curtis Bay, Md.—The Baltimore & Ohio R.R. has awarded a contract to the Surety Engineering Co., 30 Church St., New York, for the construction of a new one-story reinforced-concrete and steel addition to its local coal-thawing plant, to provide for increased operations.

Chicago, Ill.—The Chicago Great Western Railroad Co., West Harrison St., has awarded a contract to the Railroad Water and Coal Handling Co., 608 South Dearborn St., Chicago, for the construction of a new coaling station at Kansas City, Mo., to have a capacity of 100 tons. The estimated cost of the structure is $20,000.

Wheeling, W. Va.—The Hall Brothers Coal Co. is a new Ohio County company which has secured a charter authorizing a capital of $50,000, it being the purpose of the company to produce coal in the Northern Pan Handle. The incorporators of the company are John D. Hall, James B. Hall, Henry K. Hall, R. W. Hall and Martha Hall.

Birmingham, Ala.—The Champion Coal Co. has increased its capital from $2000 to $75,000, and will take steps to materially increase the production from Champion mine. W. C. Rust, of Birmingham, is president of the company. Other coal companies incorporated were the Shinbone Valley Mining Co., with a capital of $10,000; Evans Fuel Savings Co., $25,000, and Piedmont Coal Co., $15,000.

Clarksburg, W. Va.—The Baltimore & Ohio R.R. has placed an embargo against box-cars of less than 40 tons capacity going east, and such an order was sent to operators by D. R. Lawson, district representative of the fuel administration for the Fairmont-Clarksburg region. The order makes it plain that box-cars can be shipped into Ohio and points reached by Lake Michigan ferries.

Columbus, Ohio—Ohio operators in the Southern Ohio district have received a circular from W. D. McKinney, representative of the Federal Fuel Administration, urging them to cease the marketing of dirty coal. In the circular it is stated that much dirty coal is still being marketed in Ohio and that the practice should stop at once. It is asserted that some producers are marketing bone coal with the other parts of the vein.

Greenville, Ill.—State's Attorney Meyer, under orders of Attorney-General Brundage, has filed suit in the Bond County Circuit Court against the Mulberry Grove Mining Co., the Smithboro Coal Co., the Bond County Prospecting and Mining Coal Co., the Choctaw Coal and Mining Co., and the Toncars Coal Co., asking that they be dissolved for failure to file annual reports in compliance with the law under which their charters were granted.

Jefferson City, Mo.—State Fuel Administrator Crossley has issued an order that dealers must not supply coal to domestic consumers outside incorporated towns of about fifty counties of Southern and Southwestern Missouri, unless it is shown that the consumers cannot obtain wood for fuel. Local fuel committees are directed to take systematic steps to see that rural domestic fuel consumers supply themselves with wood for the winter's needs.

Toledo, Ohio—Considerable activity prevails in the lake trade as far as the Toledo docks are concerned. During the week ending Aug. 24 the Hocking Valley docks loaded 20,000 tons as compared with 198,000 tons the previous week, making a total of 2,681,411 tons for the season. During the same week the Toledo & Ohio Central docks loaded 90,000 tons as compared with 92,000 tons for the previous week. The total for the season is 1,210,000 tons.

Louisville, Ky.—The City of Louisville has paid the Louisville & Nashville Railroad Co. $7000 for a coal site on Logan St. and will spend $7000 more upon installation of switching facilities for the operation of a municipal coal yard which will supply city buildings, including schools, institutions, etc. The city has already purchased ten cars of coal direct from the mines. It is planned to use the yard in critical periods of the winter to supply coal for domestic use.

Columbus, Ohio—W. D. McKinney, Federal representative for southern Ohio and Mason County, West Virginia, is authority for the statement that 130 mines in the southern Ohio field have secured permits to ship lake coal while 170 have not received such permits. But the number which have not secured permits are generally the smaller mines, and thus the reduction in lake tonnage is not so much as might be expected from a casual examination of the figures.

Milwaukee, Wis.—The Cutler-Hammer Manufacturing Co., manufacturer of electric controlling devices and allied apparatus, announces the opening of a branch office in the Union Trust Building, 15th and H Sts., N. W., Washington, D. C. H. W. Knowles and C. W. Yerger, engineers, who are entirely familiar with the company's products, will be located at this new office. It will be operated entirely for the purpose of giving service to the Government and others having occasion to require information regarding the company's products, orders, contracts, etc.

Louisville, Ky.—Wiley B. Bryan, fuel administrator for Kentucky, has issued notice to the effect that all dealers must fill out triplicate registration blanks, showing extent of their coal business, and general particulars, filing these papers with the administration for reference. Certificates of registration will be issued to all registering dealers, and are to be posted in a conspicuous place. Dealers failing to register will be punished, also jobbers selling to such dealers. The department figures on breaking up the practices of small crooked dealers in this way.

Dallas, Texas—Wiley Blair, Federal Fuel Administrator for Texas, has issued an order directed to 152 Texas counties prohibiting the sale, shipment or distribution of coal for domestic uses within these counties. This order was issued as a means for conserving the coal supply of the state for war purposes, and the 152 counties affected are directed to depend entirely on wood and other fuels for domestic uses. The order was issued after careful investigation made by field agents of the fuel administration disclosed an abundance of wood in these counties that can be used for domestic fuel.

Indianapolis, Ind.—P. H. Penna, secretary-treasurer of the Indiana Bituminous Coal Operators' Association, has made the following statement regarding allegations that Indiana operators were paying bonuses to coal miners: "These assertions are not true. The Indiana Bituminous Coal Operators' Association has for two years been investigating reports that bonuses were being offered or paid, and thus far it has been able to prove conclusively that bonuses were paid in only two instances. It is a fact, however, that the practice of paying bonuses is not generally indulged in in this state and that the number of operators who have been guilty is negligible."

MARKET DEPARTMENT

Weekly Review

Bituminous Production Again Picking Up—Railways in Need of Stimulation—Total Soft Coal Tonnage This Year Ahead of Last Year's Output—Anthracite Shipments Show Increase

DURING the week ended Aug. 24 the production of bituminous coal showed the first improvement in five weeks, due to a slight betterment in the car supply. The output for that week totaled 12,603,000 net tons, and would have been much greater if the car allotment had been regular and the loaded cars had been speeded away from the mines. In fact, the erratic car supply during the month of August was at once the despair of the Federal Fuel Administration—which sees the demand for coal growing larger and larger—and a stumbling block to the operator—who wishes to keep his laboring forces intact and instead finds his men leaving for industries that promise more steady employment.

Attempts to speed up the miner—through the formation of production committees, the holding of patriotic meetings and the other many schemes resorted to by those interested in greater coal production—all go for naught when there is an insufficient number of cars furnished the mines. Without cars the mines cannot work. It is not alone the miners who need stimulating. A little of the energy now expended to boost coal output could profitably be devoted to inciting the railway men to greater efficiency.

However, it should not be overlooked that the production of soft coal so far this year is far ahead of the quantity mined during the same period of last year. If sufficient cars had been placed at the mines there would now be plenty of coal to meet all demands, for even with the handicap of inadequate and irregular labor the operators could have flooded the country with coal.

Anthracite production is not only keeping up, but shows an increase in output for the week ended Aug. 24 with the shipment from the mines of 2,134,000 net tons. The total production of anthracite for the coal year to date is estimated at 41,768,000 net tons, an increase over 1917 of 869,000 net tons.

The Lake trade is active. Under governmental stimulus a larger tonnage is being moved from Ohio and West Virginia to the lower lake ports. Shipments are still behind pre-season estimates, however, and in order to enable the Pittsburgh region to meet its quota coal is being withheld from all nonessential industries in that district, while plants on the preference list which had been receiving only 50 per cent. of their requirements are to be still further reduced. There is strong basis for the feeling that the Northwest will be supplied before the close of navigation.

Market conditions show no radical changes. So much domestic anthracite has already been placed in the bins of consumers that there is little reason to fear a serious shortage in that quarter. Demand is greater than the supply in all grades of coal, with the exception of certain steam sizes on the Atlantic Seaboard and screenings in the Middle West.

COAL PRODUCTION

Recovery from the slump of the past five weeks marked the production of bituminous coal during the week ended Aug. 24. The output during that week (including lignite and coal made into coke) is estimated at 12,603,000 net tons and not only exceeded the production during the week preceding by 669,000 net tons, or 5.6 per cent., but exceeded the production during the past three weeks. Production during the current week of 1918 was 1,852,000 net tons, or 17 per cent. in excess of the production during the corresponding week of 1917. The average production per working day during the week of Aug. 24 is estimated at 2,100,000 net tons, as against 1,989,000 net tons during the week preceding, and 1,792,000 net tons during the week of Aug. 24, 1917.

Production of anthracite in the United States during the week of Aug. 24 is estimated at 2,134,000 net tons, as against 1,924,000 net tons during the week preceding, an increase of 10.9 per cent., and as against 1,988,600 net tons during the corresponding week of 1917, or an increase of 7.3 per cent. The average daily production during the week of Aug. 24 is estimated at 355,667 net tons, as against 336,839 net tons during the coal year to date, and as against 329,831 net tons during the same period of 1917. Total production for the coal year to date is estimated at 41,768,000 net tons, an increase over 1917 of 869,000 net tons, or 2.1 per cent.

Shipments during the week of Aug. 24 increased from all districts with the exception of the district including northeast Kentucky, high volatile and the smokeless fields of West Virginia, and from the Rocky Mountain and Pacific Coast states. Material increases occurred in central Pennsylvania, where shipments increased 3102 carloads or approximately 8 per cent.; in Ohio, where shipments increased 2823 carloads, or 11 per cent.; and in the district including Illinois, Indiana and western Kentucky, where shipments increased 2299 cars or approximately 5 per cent. All districts, with the exception of northeast Kentucky, high volatile of south West Virginia and smokeless fields of West Virginia, report shipments considerably in excess of the performance during the corresponding week of 1917. For the coal year to date all districts, with the exception of Michigan, show increased loading.

Lake Shipments—Bituminous coal loaded on vessels at lake ports (including vessel fuel) during the week ended Aug. 24 is estimated at 1,151,744 net tons, an increase over the week preceding of 3.8 per cent., and over the weekly average during months of July and August of 11.8 per cent.

Shipments of bituminous coal to New England during the week ending Aug. 24 are estimated at 641,592 net tons, an increase over the week preceding of 59,474 net tons, or approximately 10 per cent., and over the weekly average during the coal year to date of 83,000 net tons, or 14.8 per cent. Rail receipts through the New England gateways during the current week increased 25,824 net tons or 13 per cent. over the week preceding, and tidewater shipments increased 33,650 net tons or 8.8 per cent. Shipments also increased from all harbors during the week.

Tidewater Shipments—Shipments of bituminous coal from the North Atlantic harbors and Hampton Roads, during the week ending Aug. 24, amounted to 986,797 net tons, an increase over the week of Aug. 17 of 64,967 net tons or 7 per cent., and over the weekly average for the coal year to date of 89,445 net tons, or an increase of approximately 10 per cent. Shipments from New York and Philadelphia declined slightly during the week, while shipments from Baltimore increased 21 per cent. and from Hampton Roads 12 per cent. Shipments from all harbors, during the current week, were considerably in excess of the weekly average to date.

Beehive Coke—The production of beehive coke in the United States during the week ended Aug. 24 is estimated at 592,000 net tons, as against 575,000 net tons during the week preceding, or an increase of approximately 3 per cent. The average production per working day is estimated at 99,000 net tons, as compared with 96,000 net tons during the week of Aug. 17. The operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production during the week of Aug. 24 at 402,807 net tons, and operation of their plants at 74.6 per cent. of their present capacity, as against 71.7 per cent. during the week of Aug. 17. Yard labor and car conditions improved slightly during the week.

Byproduct Coke—Operating conditions in the byproduct coke industry improved slightly during the week ended Aug. 24. The plants of the country produced 546,058 net tons, operating at 89.6 per cent. of their present capacity, as compared with 88.3 per cent. during the week preceding. The improvement during the week is attributed by the operators to better labor conditions and to repaired plants. Losses of time due to lack of byproduct coal remained constant at 2.9 per cent. Material increases in production during the week were recorded in Alabama, Maryland, Pennsylvania and Tennessee. In Alabama the improvement was brought about by repairs to plants; in Maryland and Pennsylvania by better labor conditions, and in Tennessee by other causes. The placing of new ovens in operation by the Carnegie Steel Co. at Clairton, Penn., accounts for the increase in capacity in that state during the current week.

BUSINESS OPINIONS

American Wool and Cotton Reporter—Manufacturers are not hurrying to buy cotton at present prices. It is understood that the Government desires for the mills to anticipate their wants up to Apr. 1, 1919, and if possible to make their purchase for that period by Nov. 1. It will be possible to buy the cotton, but the United States Government must of course see that the cotton is shipped, and that seems to be the difficult part of it.

Bradstreet's—The broad tendency is to buy goods only as needs require, there being enough uncertainty ahead to cause chariness. Some sections are more cheerful than others, the South, Northwest and far West being conspicuously optimistic, and even where conservatism prevails, complaints are not serious. In the Southwest, where

drought has struck hardest, the big wheat crop, activity in oil, and vigorous operations in mining afford compensatory advantages.

Dry Goods Economist—Cotton and cotton-goods prices continue to hold the chief interest in all discussions of conditions in the textile world. During the week disturbing reports as to the weather in cotton-growing districts were prevalent in New York, and each new report was followed by new and higher prices for cotton on the New York Cotton Exchange. Because of the high cost of cotton and uncertainty as to the prices that will prevail at the time when the cotton now being contracted for is made up, manufacturers are not seeking future business with the same eagerness as in former seasons. Some, in fact, refused to make any quotations on certain goods this week, while others merely state that "Government prices" will prevail.

The Iron Age.—A swelling of overseas demand, due to the aggressive activities of the Allied forces, has changed greatly the operating schedules of the mills. Urgent calls have been received for rails, rolling stock and shell steel and temporarily some home needs, even cars for our own roads, may have to stand aside. Coming immediately after a heavy distribution of 82 mm. shell bars, an emergency order for 140,000 tons more of this steel, with the same amount to go each month up to February; the allocation of 75,000 tons of rails for France, and the orders now being distributed for 122,500 tons of plates and shapes for new construction in Japan for the Emergency Fleet Corporation, have already made the expected larger purchases of cars for France a matter of the farther future. Rush construction will be given 4000 narrow-gage cars for the Army abroad, following the placing last week of the 20,000 additional 30-ton cars; and many more of these larger size cars are wanted. In order that more ship, shell and rail steel may be turned out, pipe, sheet and wire mills will be cut down further in output. Some wire plants are now on a 50 per cent. basis and may be reduced still further.

Atlantic Seaboard

BOSTON

Awkward situation continues. Fuel authorities are kept busy finding places for coal and still keep within limits imposed by Washington. Belief that ruling is only temporary. Otherwise New England may lose ships that will be vitally needed later on. Hampton Roads piers show average dumping, but delay of 3 to 4 days is usual. Baltimore dispatch somewhat improved. All-rail movement has increased over July figures. Railroad fuel still greatly needed. Rumored that all-rail shipments from Pennsylvania will now be reduced to leave room for increased volume to New York piers. Queried whether pier conditions will admit of much increased tonnage, but coal is needed at points not accessible to steamers. September likely to show important developments. Anthracite rail shipments sag somewhat. New York movement of Reading barges gives no better service as yet.

Bituminous—The state of coal congestion referred to last week continues, although in somewhat modified form. It is very much the result of unequal distribution. If in the first quarter of the coal year there had been normal deliveries instead of arrears to the extent of 2,000,000 tons or more, we should not now have the pressure to unload coal that is a feature in several of the larger New England centers. The car service section of the Railroad Administration is following these instances closely, and every effort is being made to unload both cars and steamers with utmost dispatch. Unfortunately, this all reacts to the disadvantage of New England because at once the impression gains ground that this territory must be stuffed with coal. This certainly is not the fact; it is only our facilities that are congested. Labor is short, repairs are extremely hard to make, never was coal moved from the scales to the consuming territory with the expedition that obtains now. Even the railroads whose reserves are below last year's marks find themselves with much more coal at their terminals waiting to discharge and on cars at their stocking plants than at any time in their history.

It is therefore a condition awkward to handle. The New England Fuel Administration at Boston is doing its best to provide uncongested destinations for the volume of coal now coming forward. This is difficult to do and still comply with the recent ruling from Washington allowing but 60 days' supply for preferred industries. Never before has New England been limited as to the reserves to be taken on during the summer and fall, except purely by the shortage of coal, and there is increasing concern over the situation that this ruling may cease when the winter is upon us. It makes a tremendous difference to consumers in this quarter of the country whether it takes 15 days for a car to come through all-rail from the mines, or whether it takes 45 days.

The stock limits Washington has imposed are so arbitrary, and so out of line with the needs of the case that there is a well-defined feeling here they will be only temporary. State administrators have the right to recommend exemptions in what to them seem special cases. A case like Bangor, Maine, for instance, where the usual channel of supply is by water and navigation closes by Dec. 1, would probably be dealt with in this way. Otherwise, if there are no exemptions, it will soon be physically impossible to load and unload the ships with customary dispatch, and New England would then be in the position of declining the ships that were represented to be so urgently needed last spring. Once the steamers were withdrawn from this trade it would probably be most difficult to secure their return. This territory has had the advantage of continuous service for several months now of two large 12,500-ton colliers belonging to the Panama R. R., but all the time they have been running to Boston there has been but one dock where they could unload satisfactorily. Now as the result of the continuous work at that one plant, day and night, two of the large bridge towers are undergoing repairs, and it will not be possible now to unload either of the colliers mentioned in less than 90 hours, where 25 hours was a normal performance.

Dumping at Hampton Roads has somewhat improved during the past week. Coal is in better volume, and the average detention to bottoms has been reduced. Three to four days is now the usual delay, although the demands for Government service still have a most important bearing. It is understood that the line points and by-product plants are coming in for strong shipments during this month, and it is probable therefore that the movement to tidewater will soon be cut down. It has been allowed to come forward at the present rate longer than was anticipated, but even at that the detention at Hampton Roads would have been more in evidence had there not been a considerable diversion of steamers to Baltimore. At the latter port, through more careful planning, the dispatch has somewhat improved.

The average receipts at the New England gateways during August were nearly 50 cars more per day than during July. The largest part of this extra movement is due doubtless to wagon coal in box cars, the volume of which for New England has continued about 600 cars weekly, or three-fourths of the total number available from central Pennsylvania. Railroad fuel receipts all-rail were slightly less than during July.

One of the interesting facts is that the New England railroads, by several hundred thousand tons, are lacking the stocks on hand they had accumulated by Sept. 1 last year. Were there adequate berth room there is no question but the Boston & Maine and the New Haven between them could absorb whatever extra tonnage may be sent New England the next 30 days, were labor conditions easier and steamers not required to discharge at relatively so few places. The fuel authorities have resumed diverting coal at the gateways to the railroads, and it is probable that an increased movement all-rail for these requirements will be started direct from the mines.

Anthracite—All-rail receipts of domestic sizes fell off during August to a marked degree. The daily average was but 439 cars as compared with 600 during July. The sag has been felt by retailers who are getting increasingly anxious over the small progress made in filling spring orders from householders. The fuel authorities are being asked rather pointed questions as to how to proceed the balance of the season. Coal burning weather will soon be upon us, especially in the Northern section, and it will not be enough to tell consumers they will be served "in turn."

A large number of the Philadelphia & Reading Ry. barges are being sent to Port Reading to load, rather than at Port Richmond as heretofore. This is the result of action by the Railroad Administration, the effort being made to increase the movement of these barges to New England. The difficulty is that the pier facilities are inadequate for all the extra tonnage being thrown in that direction, and it is quite likely that delays in loading will more than offset any gain in movement at sea.

NEW YORK

The anthracite situation not so promising to retail dealers as it was a few weeks back. If coal is available they will concentrate efforts on small orders this month. Producers put winter prices into effect. Dumpings at the local docks fall off for both anthracite and bituminous. Manufacturers kick at maximum storage order from Washington. Public service corporations may be hard hit.

Anthracite—The situation does not look so promising as it did two weeks ago. Coal is not moving as freely and the dealers, now that September is here, are worried over the prospects. In their efforts to aid the consumer as much as possible, plans are under way to concentrate work on delivery of the one and two ton orders now on the dealers' book. Dealers are only waiting assurances from the Fuel Administration that they will get the coal, and then they will go ahead with their plans, which in part include the setting aside of one week for the delivering of these small orders.

The producers and shippers are now receiving the full winter prices for the domestic sizes of anthracite, the 30c. per ton which was deducted by Dr. Garfield on Apr. 1, from the prices for egg, stove, nut and pea having been automatically restored on Sept. 1.

The heavy production figures issued by the producing interests are not borne out by the cars dumped at the local docks during the seven days ending Aug. 30, as compared with the previous week. Reports show 7188 cars dumped as against 7616 cars, a falling off of 428 cars. For the month of August, lacking the last day, there were 31,321 cars dumped, compared with 31,284 cars dumped in July and 30,719 cars dumped in June.

The dealers in the Bronx have had a conference with representatives of State Fuel Administrator Cooke and have been assured of an increase in their tonnage of 13 per cent. over the 1916-1917 allotment. The allotment for the county is figured as 850,975 tons, while the total receipts during the current coal year—Apr. 1 to Aug. 24—have been 257,646 tons, or about 30 per cent. of the total. In order to prevent a serious situation it is claimed by the dealers it will be necessary that an average of 3297 tons daily must be received there for the next 180 days of the coal year.

Dealers throughout the city continue to call attention to the vast number of unfilled orders, but admit that the majority of these would not have been received so far in advance were it not for the urgency of the authorities. There is more coal in the house bins at this season of the year then probably ever before, and in that respect the consumer is much better off. However, many inland yards are entirely clear of supplies while others are said to have good stocks.

The movement at the docks is free. Not much delay is occasioned in loading, with boats plentiful although carrying charges are stiff. As has been the case for a couple of weeks, chestnut is running easier than either egg, stove or pea coals. The steam coals are easy. Some retail dealers have so much rice and barley on hand that they are letting the public know about it through advertising in the daily papers. Buckwheat is in good demand but there is no rush in buying.

Current quotations, per gross tons, f.o.b., tidewater, at the lower ports are as follows:

Circular	Individual	Circular	Individual
Broken..$6.75	$7.50	Buck...$5.10	$5.90
Egg.... 6.65	7.40	Rice.... 4.65	5.10
Stove... 6.90	7.65	Barley.. 4.15	4.30
Chestnut 7.00	7.75	Boiler.. 4.60	
Pea..... 5.50	6.25		

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates. Prices for buckwheat, rice, barley and boiler are not fixed by the Government.

Bituminous — Conditions in the bituminous situation are not so encouraging as the trade would like them. Receipts do not increase in keeping with the demand, due in most part to enlarged consumption by war and other industries which is more than likely to increase now that fall and winter is upon us.

The new fuel ruling fixing maximum limits for storing bituminous coals has not pleased everybody, and some manufacturers near New York claim it will cause hardship. Public service corporations will be hard hit, and already steps are being taken to have the order modified.

The falling off in production is accentuated in the number of cars dumped at the local docks during the week ending Aug.

30, the reports showing 6582 cars dumped as against 7091 cars the previous week. For the first 30 days of the month 30,126 cars were dumped as compared with 30,372 cars in July and 31,129 cars in June.

There has been a good movement of commercial coals and regulars are getting all they need for current uses, with some left over for stocking. In certain instances shippers have been instructed to stop shipments to non-essential industries and to concentrate their shipments to plants on the preferred lists. Coals for the spot buyer are just as scarce as ever, and there is little to be had.

Bunkering continues to be heavy, with plenty of coal for the purpose to be had.

Current quotations, based on Government prices at the mines, net ton, f.o.b., tidewater, at the lower ports, are as follows:

	Mine Gross	F. o. b. N. Y. Gross
Central Pennsylvania:		
Mine-Run, prepared or slack.....	$3.30	$5.45
Upper Potomac, Cumberland, and Piedmont Fields:		
Run-of-Mine.....	3.08	5.23
Prepared.....	3.36	5.51
Slack.....	2.80	4.95

Quotations at the upper ports are 5c. higher.

PHILADELPHIA

Anthracite situation gives indication of improvement. Increased allotment to be made now. Retail labor shortage coming. All sizes active, with stove in strongest demand. Preparation is good. Steam sizes fully taken. Bituminous shortage still exists.

Anthracite—As fall approaches we are becoming convinced that this city will avoid many of the anticipated coal troubles. Each week the feeling of optimism grows among the larger buyers. At the office of the largest shipping company the same confidence is expressed and the reason given is that they will have a substantial tonnage to distribute on account of the prohibition of shipments to numerous points formerly supplied with anthracite. While many complaints continue to come in most of them are from small communities where a few thousand, or even a few hundred tons, will fulfill the shipper's obligations.

Locally the shipments were quite heavy during the last half of the month, and a number of dealers have fair stocks because they were unable to deliver the coal as rapidly as it came in. Yet even with this condition we are safe in saying that the city has not reached the quota allotted to it, and that is one reason why the dealers are expecting particularly heavy shipments during the early fall.

The increased allotment of 18 per cent. to the state was only officially announced recently, and now the increased proportions to each community are awaited with more than ordinary interest. These figures have been decided upon by the Anthracite Committee on Distribution and in many instances are known, but until each shipper is notified as to his quota they are not considered official. There are some shippers who will be unable to furnish any substantially increased tonnages to their trade for the reason they have already been called upon to accept business not formerly cared for by them.

The advance of the wholesale circular on domestic sizes provoked quite a little discussion before it was officially announced. Of course, the advance of 30c. at this time was fixed last spring by the national authorities, but during the past week there was a persistent rumor that the increase was even to be greater than this. To most people, however, this was felt to be purely conjecture, as it was hardly thought that the Government after once fixing the price would take the opportunity to advance it at this time. It seems likely that the rumor has grown out of the fact that the miners are asking for an increased wage schedule. Even though this has been denied by Dr. Garfield, the men still feel confident that their appeal to President Wilson will not be without result. Even in the event of a favorable outcome of their request it was not expected that the new schedule would become effective before the first of the year.

Naturally, just before an advance in prices all family sizes were in great demand, but if there is one size any shorter than the others it is stove coal. Before many weeks the dealers expect to persuade their customers to accept any size they may have on hand, but up till now the buyer of family coal insists on having what he is used to burning. This is the cause of much complaint to the dealers whose trade is not familiar with conditions.

Once more the dealers have been urged by outside organizations to expedite unloading of coal. There is hardly any question that the anthracite trade releases railway equipment about as promptly as any industry. The latest plan is to have them unload on Sunday, which many of them have done for months. However, it is planned to have a force of laborers go from yard to yard on that day and thus effect an economy in labor and at the same time release cars promptly. So far as can be learned the dealers are willing to cooperate in the movement.

The question of preparation came to the fore recently due to the fact that several cars of river coal were condemned in the region for containing at least 50 per cent. foreign matter, such as stones and dirt. On the average, however, the production of both colliery and washery coal is well up to the average of preparation and there can be no real complaint on this score. The double check inspection is still effective in the region whereby inspectors of the Fuel Administration pass upon the coal after the colliery inspectors examine it.

There is no change of any moment in the steam trade. Buckwheat if anything has tightened up a trifle; at least less of this size is coming to the retailers for domestic trade. Barley and rice are also eagerly sought, mostly of course by those concerns who are stocking it for the future. Culm also showed a little increased activity, due probably to the slight decreased shipments of bituminous lately.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4.90	$6.25	Buckwheat	$3.40	$4.45
Egg	4.80	6.15	Rice	2.90	3.80
Stove	5.05	6.40	Boiler	2.70	3.70
Nut	5.15	6.50	Barley	2.40	3.30
Pea	3.75	5.00	Culm	1.25	2.15

Bituminous—No improvement can be noted in bituminous coal. The mines continue to report a shrinkage of production, due to the unequal car distribution. Nothing that the operators have done seems to make any impress upon the railway authorities as to a change in the method. There does not seem to be any actual lack of cars along the line, it simply being a question of giving them to the mines at the time and in the number in which they are needed.

As a consequence of the somewhat shortened production the distribution committee has started to cut down some plants which have been getting quite heavily stocked ahead. They have taken the stand that many plants with at least a 60-day supply ahead can easily stand having their receipts cut to at least sufficient for current use for a while.

BALTIMORE

Bituminous coal being more evenly distributed as to quantity, but kicks being made as to quality and prices because of box-car shipments. Hard coal men unable to get action so far on price increase and are hard hit by labor deflections.

Bituminous—Under the Government plan limiting coal storage for both essential and nonessential industries, and for all even within the preferred classes, the Maryland fuel administration is now able to make a more equitable distribution of coal here—at least as to amount. It is for the moment not so much a question of supplying coal to a particular consumer who is running low as it is to satisfy him with the kind of coal that is on hand to distribute, and to keep him cool in spite of the fact that his shipment is in many cases in box cars and will cost him around $2 above the ordinary Government price—when the 75c. extra for this coal to operators and the additional costs of unloading per ton are figured.

Some kicks are being made about the quality of the coal received. Much of that coming in box cars, and for which the fancy Government price with additions is paid, is of wretched quality. Some who have received it say that it will not burn at all unless it is mixed with coal of a better quality. The electric power company is still curtailing power, even to war plants, claiming that it cannot get enough coal from the National Fuel Administration, or the quality of coal required to give boiler efficiency. The public service supply was some time since taken out of the hands of the Maryland administrator and the Washington administration undertook to handle the situation direct.

Anthracite—Receipts here continue light despite the fact that there is now reported to be a good flow of coal into the Washington district, so liberal recently, it is understood, that district dealers were unable to handle it promptly and much went into storage in the larger yards. Appeals from the Baltimore section for an increase in movement have not been met as yet. In the meantime dealers find it difficult to keep things going because of labor defections to higher paying Government and war work, which is advertising wages above the coal-yard limit. Despite the fact that dealers have been unable to get action on their appeal for an increase of 20c. a ton in hard coal to cover a wage-increase plan to hold drivers and yard helpers, a number have individually been forced to jump pay rates from 30 to 35c. an hour on a ten-hour day to hold their workers.

Lake Markets

PITTSBURGH

Special attention to byproduct coal. No stocking in district. No open market.

The order of the Federal Fuel Administration upon the distributor of Pittsburgh district coal to curtail shipments to line trade on the preference list to 50 per cent., has just been rescinded. Records of lake shipments for the month of August are not yet available, but it is thought possible that the other districts are doing better so that Pittsburgh need not exceed its quota as much as was expected would be necessary.

The matter of coal for byproduct coke oven continues to receive close attention by the Fuel Administration, it having been made perfectly clear that the chief limiting factor in steel production, or rather the chief factor that can be eliminated, is the supply of coke for blast furnace use, and that depends upon coal supply as there is ample coke-oven capacity. The chief shortage in byproduct coal has been at Youngstown.

The Fuel Administration is considering the starting of Connellsville ovens closed by the Steel Corporation as a result of its inaugurating byproduct coke manufacture at Clairton. The coke produced would be at the disposal of the Fuel Administration, which would be under obligation at the same time to find coal for operating the Clairton plant. It is not known yet whether the proposed arrangements are practicable.

The schedule of quantities of coal that consumers are permitted to stock, expressed in terms of 20, 30 and 45 days' consumption, is not interesting to the Pittsburgh district, seeing that stocking is entirely prohibited in the case of this district, except perhaps of byproduct coal.

There are no open market transactions, all production going out on contracts or being taken by allocations. Maximum prices remain: Slack, $2,10; mine-run, $2.35; screened, $2.60, per net ton at mine, Pittsburgh district, brokers being allowed to charge 15c. for brokerage in addition.

BUFFALO

Coal embargoes are disturbing certain classes of consumers. Others found with big stocks are also cut off. General situation not much changed. Anthracite receipts in the city light.

Bituminous—The authorities have been looking into the local coal needs and have made up a list of certain manufacturers who are considered non-essential at the present time. These will have to suspend. All effort is being made to get coal to the farthest outlying districts that are adjudged entitled to it. So much Pittsburgh coal is going to the lakes that shippers here who have always had plenty to distribute are looking elsewhere for a supply.

It is the aim of the authorities to cover all remote all-rail territory as soon as possible. It is said that a coal car can make the round trip to northern New York or New England in about 21 days now, but that it will take 55 days in severe winter weather and that is the reason why Buffalo, which is comparatively near the mines, is getting so little just now of either bituminous or anthracite.

The demand for bituminous is not heavy. If the coal did not go out of its regular territory so much on special orders it would be quite sufficient for all needs. When the lakes close, which will be three months hence, the increased flow to this territory ought to satisfy us, especially since Canada has been cut down in its supply.

Bituminous prices are mostly made up at the mines, but the delivered prices are still $4.65 for thin-vein Allegheny Valley, all sizes: $4.45 for Pittsburgh lump; $4.20 for mine run and slack; $5.60 for smokeless

and smithing; $6.20 for cannel, all per net ton, f.o.b. Buffalo.

Anthracite—The trade is still much distressed by shortage and certain restrictions and allotments, which do not at all agree with the wishes and apparent needs of the consumers. What they want is the filling of their orders, and some of them cannot see why it is not done. Many of them will accept all the coal they can get, even if it may be, by some mistake or carelessness of the distributor, much more than they need.

Lake shipments have improved again, which may account for the small amount allotted to Buffalo. For the week the loadings for the upper lakes were 119,500 tons, of which 46,200 tons were for Duluth-Superior, 19,300 tons for Fort William, 17,800 tons for Milwaukee, 10,000 tons for Sheboygan, 8900 tons for Chicago, 8000 tons for Racine, 6500 tons for Green Bay, 1600 tons for Depere and 1200 tons for the Sault. Lake freights remain at 48c. to Duluth and Fort Williams, 50c. to Sheboygan and Green Bay, 55c. to Milwaukee, 60-65c. to Chicago, $1 to Racine, Depere and the Sault.

CLEVELAND

Lake shipments of bituminous have been greatly augmented in the last ten days and the movement now is approximating the mark it should have attained by the first of July. The movement in the week ended Aug. 24 was the largest of any week so far this season—1,136,033 tons. Industrial consumers known to have fair stocks or better on hand have been absolutely denied shipments. The retail trade is suffering severely because of concentration on the lake trade, but domestic users are repeatedly promised that their needs will be amply supplied before cold weather sets in.

Bituminous—Announcement that industrial users with fair-sized or better stocks on hand were to be cut off to accelerate the lake movement has been carried out to the letter. Many industrial users claim to be fast approaching the time when their stocks will have to be replenished, but so far not a minute has been lost in any plant because of a shortage of fuel. Retail coal dealers are receiving even less attention than they were a few weeks ago, the whole trend of the coal movement being toward the lake trade.

Labor conditions and the poor car supply have coöperated greatly to reduce output last week in the No. 8 district of southern Ohio. In the week ended Aug. 21, the latest for which the Pittsburgh Vein Operators' Association of Ohio has issued a report, operators belonging to the association forwarded only 4303 carloads of bituminous, divided as follows: 922 cars to railroads, 2367 to the lake trade, 774 to Ohio, 150 to Michigan and Indiana and 90 to Canada. This is only about 70 per cent. of the usual weekly production. Dilatory labor, even more than inadequate car supply, is blamed for this showing. A great many miners now are working only four days a week, operators are complaining, and some go so far as to hint that there may be a connection with the present agitation of the mine workers for increased wages. Car supply for the week ended Aug. 24 to members of the association was 27.86 per cent. short, while in the week ended Aug. 17 it was only 23.08 per cent. short. Though the rating for the week ended Aug. 24 was 8355 cars, the supply was only 6026. The tonnage lost accordingly was 116,450, of which 103,000 tons are blamed directly to car shortage and 13,450 to mine disability, labor shortage, etc. Car supply for the week ended Aug. 24 was 33.49 per cent. short on the Pennsylvania, 28.08 per cent. short on the Baltimore & Ohio, 25.78 per cent. short on the Wheeling & Lake Erie and 11.44 per cent. short on the New York Central.

Lake Trade—The week ended Aug. 24 saw lower lake docks load 1,136,033 tons for the Northwest, a record for the season to date. In the first five days of the week ended Aug. 31 the docks loaded approximately 1,020,500 tons, so the high mark will be approximated, if not exceeded. Supplies are coming forward in better shape than at any time so far this season, due mainly to the restrictions placed upon industrial stocking. High hopes are held that in September, which is only a 3,500,000-ton month on the Federal Fuel Administration's schedule, a gain of about 500 000 tons on the deficit will be possible. The first week of September, however, will do well to show more than 900,000 tons of bituminous loaded, say vesselmen, because of Labor Day and the usual delayed pickup bound to occur on Tuesday and Wednesday of the week. Some coal docks worked Sunday in order to get freighters out of the way. Available tonnage remains all that can be asked.

DETROIT

Shipment of bituminous show a slightly larger proportion of domestic sizes. Receipts of anthracite continue light. Lake movement is still below schedule.

Bituminous—Jobbers and wholesalers in the Detroit market, as well as the consumers of domestic coal, are still taking an apprehensive view of the present situation and future outlook as regards supply of fuel for household heating. While there is said to have been a small improvement in supply of domestic stock within the last few days, the increase in supply is not yet sufficient to relieve uncertainty.

With the short interval remaining in which to provide winter fuel to something like 88 per cent. of the city's population—the proportion which a Board of Commerce investigation discloses is still unsupplied—it is pointed out by jobbers that the movement of coal of domestic type to Detroit must proceed in much larger volume than at present or many families will be obliged to suffer from unheated homes when the frosty weather arrives. There is an impression among some of the operators of large manufacturing plants that unless the outlook for adequate winter fuel supply becomes brighter swiftly, there will be a considerable exodus of workers from Detroit, seeking employment in other cities where there is a better outlook for keeping homes warm during the winter.

The supply of steam coal is fairly satisfactory in volume and seems to meet present needs of consumers, though little is left for adding to stock piles and no free coal is to be found on tracks. Quite a number of the steam plants in previous years have been wholly dependent on track coal for filling their requirements.

Anthracite—Seemingly there is no chance that Detroiters will be able to obtain a larger allotment of anthracite. The city's allowance of 601,000 tons for the year is little more than one-half the quantity actually consumed in Detroit homes last year, and besides suffering this drastic reduction in supply of anthracite the household consumers are also deprived of smokeless and are receiving little coke. Both coke and smokeless have been used extensively in Detroit in past years as substitutes for anthracite. The movement of anthracite into Detroit is small, and jobbers can see no indications of improvement in the near future.

Lake Trade—Shipments of coal by lake routes are not yet coming up to the schedule fixed by shippers. Many boats available for coal cargoes are being sent up light.

COLUMBUS

Special efforts are being made to stimulate production in Ohio in order to avoid coal shortage. A large tonnage is moving via the Lakes to the Northwest. There is also a good demand, both for steam and domestic tonnage.

The feature of the coal trade in Ohio is the effort being made along patriotic lines to stimulate production in every mining field of the state. The lake trade is one of the most active departments of the industry. Under governmental stimulus a larger tonnage is being moved from Ohio and West Virginia mines to the lower lake ports. Reports show that the vessel movement is generally good and that little time is lost at either end of the journey. The lake tonnage is still behind pre-season estimates, but there is a feeling that the Northwest will be supplied before the close of navigation. Lake prices have been affected by the recent reductions announced in Ohio fields. The upper lake docks are generally free from congestion and that is aiding the movement.

The steam trade is strong, although the tonnage available for steam consumers is not large. A considerable amount of screenings is available. Surplus stocks are being called upon to supply factories and public service concerns. Railroads are taking a big tonnage as the freight movement is generally large. On the whole the steam trade is rather active and no one is especially suffering for fuel.

The domestic trade is also strong and some tonnage is available to take care of private users. Retailers are generally short of stocks, however, and strenuous efforts are being made to secure coal. Mine-run is one of the principal grades now delivered. Pocahontas is practically off the market and there is little anthracite available. Retail prices are strong at the new levels occasioned by the reduction in Ohio prices.

Production is rather good and reflects the special pains put forth by interested officials to uphold the output. Car shortage is appearing in some sections, some time before it was expected. There is a shortage of motive power on some of the coal-carrying railroads. In eastern Ohio the output is good and is estimated at 75 to 80 per cent.

Prices on short tons f.o.b. mines are as follows:

	Hocking Thin Vein	Hocking Thick Vein	Pomeroy	Eastern Ohio
Sized grades.....	$3.00	$2.75	$3.00	$2.60
Mine-run.....	2.75	2.50	2.75	2.35
Screenings.....	2.50	2.25	2.50	2.10

CINCINNATI

Inadequate car supply is reported from several districts, cutting down shipments and bringing the Lake movement below the schedule. Otherwise conditions are excellent, including labor.

With reports indicating that the Lake movement is not quite up to the volume scheduled for it by the Fuel Administration, it is evident that the trouble lies principally with the shortage of cars, of which complaints have been numerous and vigorous during the past week. From sections shipping coal into this vicinity—the Kanawha district on the one side and the Knox County district of Indiana on the other—have come assertions that in each case 4000 men are out of work for at least two days a week on account of the inadequacy of the car supply, resulting in a proportionate loss of production. When it is considered that there is a keen demand for labor among manufacturing industries, and that there is also fear of a shortage of labor at coal mines, it can be seen that the car shortage, with its tendency to result in men going elsewhere to work, is serious in more ways than one. There is no apparent remedy possible for the limited car supply, as the Railroad Administration is said to be doing everything in its power to insure an equitable distribution of the cars available, and deliveries of new cars are not progressing with sufficient rapidity to make any appreciable difference. Operators and miners alike are working hard to keep production up to the maximum, but they are of course absolutely limited as to loading by the car supply.

LOUISVILLE

Somewhat better movement of eastern Kentucky mine-run coal to Louisville section. Both western and eastern Kentucky lump scarce. Domestic demand taking care of all receipts of lump coal. Nut and slack showing slight accumulation, consisting of western Kentucky grades.

The situation has shown slight improvement during the past few days. There has been a better car supply in eastern Kentucky, and the western Kentucky supply has been holding up fairly well. Labor has been uncertain, with good supplies one day and poor supplies the next, due to the fact that much part-time farm labor is employed in the mines. However, production in both fields has been somewhat better, with a better movement of eastern Kentucky coal to the lakes, and slightly more coal available for the retailers and jobbers as well as industrial consumers.

The stocking demand continues good, and retailers are still delivering all the lump they can secure without accumulating any yard stocks. A good deal of lump has been going to industrial plants during the past few days, reducing the available supply for domestic stocking. Retailers are fairly well caught up on western Kentucky domestic stocking orders, but are far behind on deliveries of eastern Kentucky coal in cases where people have absolutely refused to accept western.

The steam demand is well taken care of with ample supplies on hand to keep all industrial concerns well supplied. Steam buying has been fairly active, but has not shown near the activity that domestic demand has shown, as industrial concerns are relying on priority needs, and not stocking to any great degree.

No anthracite coal can be sold in Kentucky, but under the regulations Indiana is open to such coal. However, local dealers who have been endeavoring to secure anthracite coal in car lots for deliveries to southern Indiana consumers have been unable to secure supplies, there appearing to be some sort of a mix up in interpretation of the regulations.

Few local retailers are in position to take advantage of the present opportunity to secure eastern Kentucky mine run, not having screens or facilities for sorting the coal, except by hand. Such concerns as have screening plants are managing to secure plenty of coal, and are being offered more business than they can begin to take care of.

BIRMINGHAM

Demand good, but a little easier in steam grades. Domestic sizes strong. Production will probably show some increase over last week, better time being made by mine workers and car supply more liberal.

Reports indicate that steam coal users in some sections have got a little ahead in their supply and are not pushing the mines so strongly for shipments. Inquiries are more than sufficient, however, to take every ton of coal produced at the mines, the output continuing to lag unduly on account of the time being lost by mine workers from their duties, and a slightly crippled car supply.

The domestic market continues brisk, receipts at the yards being about normal with those of the past few weeks. Many unfilled orders are in the hands of the dealers and coal received by them is promptly applied against the business in hand and stocks on the yards are at a low ebb.

Coke

CONNELLSVILLE

More byproduct ovens. Coke supplies fairly adequate. Old screenings advanced.

The Carnegie Steel Co. is now operating about 350 byproduct ovens at the Clairton plant, where the first coke was made late in June. Output, however, is much below rated capacity and partly, it appears, by reason of coal scarcity. Ovens still to be completed at the plant this year will make a total of 640. Present output is a trifle more than 10,000 tons weekly, but full output for the 640 ovens is estimated at about 50,000 tons weekly. The Steel Corporation has recently closed some beehive ovens in the Connellsville region, in connection with its increased byproduct production elsewhere, and the necessity for using the coal in the byproduct ovens. The Fuel Administration now has a project which would involve resuming operations at the closed beehive ovens and would distribute the coke where needed. To put the project through it is necessary for the Fuel Administration to provide a supply of coal for the byproduct ovens, which would be deprived of their present supply from the Connellsville region.

Coke supplies at western Pennsylvania and Ohio blast furnaces are fairly adequate, although there are occasional slight shortages. A considerable tonnage of Connellsville coke continues to be diverted to eastern consumption. There continues to be a good supply of foundry coke offered, and indeed some blast furnaces assert that the operators are offering 72-hour coke for foundry purposes beyond what is needed, and should sell the coke for blast furnace use. Sellers of the best grades of crushed coke recovered from old dumps have advanced their price from $6.50 to $6.75 and state that they have no difficulty in securing the higher price, the material going for household consumption. This is clean prepared coke, over 2-in., the official limit being $7.30. Various other descriptions are offered at lower prices. Set prices remain: Furnace, $6; foundry, 72-hour selected, $7; crushed, over 2-in., $7.30, per net ton at oven.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Aug. 24 at 337,705 tons, an increase of 11,095 tons. Raw coal shipped out of the region amounted to 214,000 tons, an increase of 24,000 tons.

Buffalo—The demand is always in excess of the supply. This is likely to continue till the war is over. Coke is needed about as much as steel and iron, so that the consumers are able to get together just barely enough to keep in operation. The ovens, byproduct as well as beehive, are coking all the coal they can get, and every effort is being made to increase the capacity of the city coke plants, apparently with the idea that the coal will be forthcoming somehow. Gashouse coke is chiefly used by the gas company to fire its own boilers, and the rule is not to quote it to anybody.

Middle Western

MILWAUKEE

Receipts by lake during August the heaviest of the year. Not much more of the better grades of coal expected, however. Illinois screenings being pressed for use.

The month of August has been prolific in coal receipts at Milwaukee, the record being the highest of any like period since the opening of navigation. With three days to hear from, the total receipts of hard coal for the month aggregate 110,200 tons and of soft coal 684,654 tons. This makes the totals for the season thus far 355,684 tons of hard and 2,040,556 tons of soft coal.

While the foregoing figures have a reassuring influence, State Fuel Administrator Fitzgerald says Wisconsin is much better supplied with coal than any other state and that it is probable not a great deal more of the better grades of coal will be allowed to come here. In view of this prospect, he urges that conservation be practiced in every possible line. Manufacturers are requested to use as large a proportion of Illinois screenings as is possible during the remaining summer and fall months in order to preserve the supply of lump coal for winter use. In the opinion of Mr. Fitzgerald the supply of Hocking and Youghiogheny coal for the West will be cut down because of the necessity for diverting more of it to the East to make up for a shortage in anthracite in that section. In corroboration of this situation he points to the fact that 100,000 tons of screenings from Illinois mines is being shipped to Sandusky, Ohio, by rail and thence by lake to the Canadian Northwest.

Dockmen gave the retail middlemen a rude jolt this week by summarily making an additional cut of 50 per cent. in their allotments of anthracite. This means that many of the smaller dealers will not be able to supply their customers. Many deskroom dealers are being forced out of business by inability to obtain supplies of hard coal.

ST. LOUIS

A continued quiet market with the domestic demand easing up. Very little steam business, excepting railroad orders, which are light, and a surplus of steam coals, with an increasing car shortage. Transportation poor and light country demand.

Conditions continue extremely easy. The retail dealers have at this time no unfilled orders for Standard coal, practically none for Mt. Olive, but the tonnage unfilled for Carterville is greater than they will be able to take care of for the next couple of months. That element of the population that are able to buy storage coal in the summer months seem to have been pretty well taken care of, and it is estimated by the Fuel Committee that 75 per cent. of the residences and homes in St. Louis that could buy coal in the summer time of the Mt. Olive and Standard grade have their coal in.

The retail trade is not pushing orders right now with any undue haste, for fear that later on there will be no business at all and their equipment will be idle. They would rather have a scattered business from this time on rather than have it all now and none later, and that is having some effect on the market.

In the Carterville field the car supply is extremely poor, especially on the Iron Mountain. This road seems to have gone to pieces in the matter of equipment and transportation. The Illinois Central seems to be in the best shape of any for this field.

The operators here are making strenuous efforts to keep their tonnage up, but everything seems to be against them. A good portion of this tonnage still continues to go for railroad purposes, and the output of some small mines is going exclusively for railroad in the form of mine-run. The same condition applies in a general way to the Duquoin field. This territory is in somewhat better shape now as regards water, inasmuch as there have been several rains in the last week or two.

The conditions at the present time in the Mt. Olive field have changed somewhat. Transportation and shortage of cars and the new Illinois draft is the cause of some uneasiness, although miners are supposed to be exempt, but there is a tendency on the part of many miners to enlist in the Navy or the Marines rather than take a chance of not being exempt. In a general way, however, the tonnage from this field is just about equal to the demand.

The Standard field has its ups and downs and some mines have been idle for three days straight on account of no equipment. The Louisville & Nashville seems to have blown up right, and the Illinois Central is in a deplorable shape for equipment.

There has been a surplus of screenings and the operaors have tried to unload as much of their coal in the form of mine-run on railroads as possible; 2-in. lump is not moving well, while the demand for nut and 6-in. is greater than can be taken care of. In a general way, however, there is a surplus in the field of steam coal, and were the market in shape to anywhere near absorb the screenings there would be a surplus of domestic sizes.

There has been no change in the retail prices for some time. They are for all sizes: Carterville, $6.20, Duquoin district, $5.95, Mt. Olive, $5.70, and Standard, $5.45.

The Mt. Olive and Standard prices have been cut, however, to the extent of 50c. a ton in many cases to move the tonnage.

In a wholesale way the Standard market is slightly under the Government maximum. Screenings are around $1.50 to $1.60 and mine-run at about $2.10 to $2.20.

The Government maximum here is:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump...	$2.55@2.70	$2.55@2.70	$2.40@2.70
3x6-in. egg..	2.55@2.70	2.55@2.70	2.35@2.55
2x3-in. nut..	2.55@2.70	2.55@2.70	2.35@2.55
No. 2 nut....	2.55@2.70	2.55@2.70	.....
No. 3 nut....	2.55@2.70	2.55@2.70	.....
No. 4 nut....	2.55@2.70	2.55@2.70	.....
No. 5 nut....	2.05@2.20	2.05@2.20	.....
2-in. scrgs...	2.05@2.20	2.05@2.20	1.25@1.50
3-in. lump...	.....	.....	2.25@2.40
2-in. lump...	.....	.....	2.25@2.40
Steam egg...	.....	.....	2.25@2.40
Mine run....	2.35@2.50	2.35@2.50	1.85@2.00
Washed:			
No. 1.....	2.75@2.90	2.75@2.90	.....
No. 2.....	2.75@2.90	2.75@2.90	.....
No. 3.....	2.55@2.75	2.55@2.75	.....
No. 4.....	2.55@2.75	2.55@2.75	.....
No. 5.....	2.05@2.20	2.05@2.20	.....

Williamson and Franklin County rate is $1.10; Duquoin field, $1; Standard and Mt. Olive fields, 95c.

SEATTLE

Washington mines fall behind in output owing to disastrous fire and shortage of men. Advance in wage scale expected to prevent shipyards taking miners. Large exports being made to South America.

Figures compiled by the state fuel administration disclose the fact that for the month of June the coal mines of the state were 29,000 tons short of their expected production. Of the shortage 16,000 tons was lost by the mines in the Kittitas County district, due in part to the fire at Cle Elum. The fuel administration estimates the state is short 738 miners, and the loss in coal as a result approximates 4800 tons a day. Within a year the draft has taken 320 men and a further loss of 150 is expected in the September call. Many miners are going into war industries and shipyards where the basic pay is higher than in Washington mines. It is expected here that wages will be raised in the state fully 20 per cent., in which case a big increase may be expected in the price of coal. On Jan. 1 of this year there were 5914 men employed in the mines of the state. By June this had dropped to 5250, and today stands at 5176. If the present rate of decrease keeps up there will be less than 5000 men in the mines by Christmas.

The men needed immediately for Washington mines are listed by D. C. Botting, district representative for the Federal Fuel Administrator, as follows: Miners, 528; outside men, 107; inside men, 46; timber men, 15; helpers, 5; timber packers, 8; drivers, 4; rope riders, 1; rock men, 5; track men, 1; coke drawers, 5; motormen, pump men, electricians and other mechanics, 13. The King County district needs 181 men; Kittitas district, 462 men, and Pierce County district, 85 men.

As a means of relieving the pressure upon eastern coal, Washington coals will be tested in South American industrial plants. Heretofore the coal for South American export has been taken from the mines of West Virginia, Pennsylvania and Maryland, but the mines there are now bearing the heaviest burdens in producing coal for Government uses. About 100,000 tons of coal will be shipped from this port during the rest of 1918 to Peru and Chile.

General Statistics

NORFOLK & WESTERN

Below is given a statement of the coal tonnage from mines on the Norfolk & Western R. R. and from other railroads for the month of July, 1918.

From:	Net Tons
Pocahontas field	1,459,618
Tug River district	297,291
Thacker district	283,564
Kenova district	104,374
Clinch Valley district	170,550
Other Norfolk & Western Fields	16,976
Total Norfolk & Western fields	2,332,373
Williamson & Pond Creek R.R.	195,769
Tug River & Kentucky R.R.	62,992
All other railroads	118,752
Grand Total	2,709,886

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

STEEL SHEET PILING—The following price is base per 100 lb. f.o.b. Pittsburgh, with a comparison of a month and a year ago:

Current	One Month Ago	One Year Ago
$4–5	$4–5	$3.60

PIG IRON—Below are the present quotations, with a comparison of a month and a year ago:

	Current	One Month Ago	One Year Ago
CINCINNATI			
No. 2 Southern foundry	$36.60	$36.90	$49.90
No. 2 Northern foundry	.....	36.26	56.20
NEW YORK †			
No. 2 X Northern foundry	34.40	34.40	54.25
No. 2 plain Northern foundry	33.90	33.90	53.75
No. 2 Southern foundry	40.70	39.00	52.75
BIRMINGHAM			
No. 2 Southern foundry	33.00	33.00	47.00
CHICAGO			
No. 2 Northern foundry	33.00	33.00	55.00
No. 2 Southern foundry	38.00	38.00	.....
PITTSBURGH			
Bessemer iron *	36.60	36.60	55.95
Basic iron *	32.00	32.00	53.00

* These prices include the freight charge from the valley to the Pittsburgh district. † Delivered Tidewater, New York.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill, Pittsburgh	—New York— Current	One Year Ago	St. Louis	Chicago
Beams, 3 to 15 in.	$3.00	$4.245	$5.25	$4.27	$4.27
Channels, 3 to 15 in.	3.00	4.245	5.25	4.27	4.27
Angles, 3 to 6 in., ¼ in. thick	3.00	4.245	5.25	4.27	4.27
Tees, 3 in. and larger	3.05	4.245	5.30	4.27	4.27
Plates	3.225	4.745	9.00	4.52	4.52

BAR IRON—Prices in cents per pound at cities named are as follows:

Pittsburgh	St. Louis	Denver	Birmingham
3.50	4.24	4.60	4.75

NAILS—Prices per keg from warehouse in cities named:

	Mill Pittsburgh	St. Louis	Denver	Chicago	Birmingham	San Francisco	Dallas
Wire	$3.50	$4.50	$5.05	$4.32	$5.00	$5.95	$4.75
Cut	4.00	5.50	.....	4.47	....	6.40	.....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh	Cincinnati	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes ⅞-in. and larger	$3.90	$6.00	$4.50	$5.30	$6.70	$6.00	$5.30
Track bolts	4.90	8.90	5.50	Prem.	8.00	8.25	6.30
Standard section angle bars	3.25	....	4.45	Prem.	5.15	....	6.65

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
17½%	List	+10%	+15%	+40%	+30%

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	$5.75	$7.00	$6.50	$6.25	$8.00	$7.50
Assorted	5.90	7.00	6.50–7.00	6.40	8.25	7.75

Cincinnati—Horseshoe nails sell for $4.50 to $5 per 25-lb. box

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	—New York— Current	1-Month Ago	One Year Ago	Chicago	St. Louis	San Francisco
4 in.	$64.35	$64.35	$68.50	$64.80	$63.00	$80.50
6 in. and over	61.35	61.35	65.50	61.80	60.00	77.50

Gas pipe and 16-ft. lengths are $1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	—Pittsburgh— Current	One Year Ago	—Chicago— Current	One Year Ago
Standard Bessemer rails	$57.00	$38.00	$67.00	$38.00
Standard openhearth rails	55.00	40.00	65.00	40.00
Light rails, 8 to 10 lb.	*3.135 (100 lb.)	83.00	*3.135 (100 lb.)	68.00
Light rails, 12 to 14 lb.	*3.09 (100 lb.)	82.00	*3.09 (100 lb.)	67.00
Light rails, 25 to 45 lb.	*3.00 (100 lb.)	75.00	*3.00 (100 lb.)	65.00

* Government price per 100 lb.

OLD MATERIAL—The prices following are per gross ton paid to dealers and producers in New York. In Chicago and St. Louis the quotations are per net ton and cover delivery at the buyer's works, including freight transfer charges:

	New York	Chicago	St. Louis
No. 1 railroad wrought	$30.80	$31.00	$34.00
Stove plate	26.20	25.00	19.00
No. 1 machinery cast	34.00	29.50	21.50
Machine shop turnings	16.25	17.00	19.00
Cast borings	16.25	17.10	18.50
Railroad malleable cast	31.20	29.00	25.50

COAL BIT STEEL—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Denver
$0.12	$0.16½	$0.18	$0.19	$0.17½

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	15c.	16c.	15c.
Hollow	24c.	....	....

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

BUTT WELD

Steel Inches	Black	Galvanized	Iron Inches	Black	Galvanized
⅛, ¼ and ⅜	44%	17%	⅜ to 1½	33%	17%
½	48%	33½%			
¾ to 3	51%	37½%			

LAP WELD

2	44%	31½%	2	26%	12%
2½ to 6	47%	34½%	2½ to 4	28%	15%
			4½ to 6	28%	15%

BUTT WELD. EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	40%	22½%	⅜ to 1½	33%	18%
½	45%	36½%			
¾ to 1½	49%	36½%			

LAP WELD. EXTRA STRONG PLAIN ENDS

2	42%	30½%	2	27%	14%
2½ to 4	45%	33½%	2½ to 4	29%	17%
4½ to 6	44%	32½%	4½ to 6	28%	16%

From warehouses at the places named the following discounts hold for steel pipe:

	—Black— New York	Chicago	St. Louis
⅜ to 3 in. butt welded	33%	43%	37%
3½ to 6 in. lap welded	15%	39%	33%
	—Galvanized— New York	Chicago	St. Louis
⅜ to 3 in. butt welded	16%	28%	22%
3½ to 6 in. butt welded	+3	25%	19%

Malleable fittings. Class B and C, from New York stock sell at list price Cast iron, standard sizes, 5%.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair sized orders, the following amount is deducted from list:

	—New York— Current	One Year Ago	—Cleveland— Current	One Year Ago	—Chicago— Current	One Year Ago
Hot pressed square	$2.50*	List	$1.20	$1.65	$1.05	$3.00
Hot pressed hexagon	2.50*	List	1.00	1.50	.85	3.00
Cold punched square	2.50*	List	.75	1.25	1.00	2.00
Cold punched hexagon	2.50*	List	.75	1.25	1.00	1.60

* List plus.

Semi-finished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	40%	50%
Chicago	50%	50%
Cleveland	60%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
⅜ by 4 in. and smaller	30%	45%	37%
Larger and longer up to 1 in. by 30 in.	15%	37%	25—5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York..... $2.50 Cleveland..... $1.50 Chicago..... $2.50

For cast-iron washers the base price per 100 lb. is as follows:

New York..... $5.00 Cleveland..... $4.00 Chicago..... $3.50

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ⅞ and smaller	30%	45—5%	45%*
Tinned	30%	45—5%	45%*

Buttonheads, ½, ¾, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:

New York..$5.65 Cleveland...$5.15 Chicago....$5.67 Pittsburgh...$4.65

Coneheads, same sizes:

New York..$5.75 Cleveland...$5.25 Chicago....$5.77 Pittsburgh..$4.75

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	St. Louis	Birmingham	Denver
Cup	7	7	8½	12½
Fiber or sponge	8	....	8½	20
Transmission	7	7	9	20
Axle	4½	4	3¾	5½
Gear	4½	....	8	9
Car journal	22 (gal.)	....	5½	8½

BABBITT METAL—Warehouse prices in cents per pound:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	125.00	70.00	103.00	70.00	96.00	70.00
Commercial	70.00	40.00	23.00	24.50	25.00	25.00

HOSE—Following are prices of various classes of hose:

Fire	50-Ft. Lengths
Underwriters' 2½-in.	75c. per ft.
Common, 2½-in.	40%

Air	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.55	$0.30	$0.25

Steam—Discounts from list

First grade.....30% Second grade.....30–5% Third grade.....40–10%

LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade	Heavy Grade
St. Louis	28%	35%
Denver	40%	30%
Birmingham	35%	35%
Chicago	45%	40%
Cincinnati	40—10%	40%

RAWHIDE LACING—35% off list.

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$0.99
Asbestos for high-pressure steam	1.76
Duck and rubber for piston packing	1.10
Flax, regular	.99
Flax, waterproofed	1.21
Compressed asbestos sheet	1.10
Wire insertion asbestos sheet	1.30
Rubber sheet	.66
Rubber sheet, wire insertion	.99
Rubber sheet, duck insertion	.55
Rubber sheet, cloth insertion	.25
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.21
Asbestos wick, ½- and 1-lb. balls	.75

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+20%
Galvanized cast steel rigging	List
Bright plain rigging	30%
Bright cast steel	17½%
Bright iron and iron tiller	5%

MANILA ROPE—For rope smaller than ½-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ¼-in., 8 ft.; ⅜-in., 6; ½-in., 4½; ⅝-in., 3½; ¾-in., 2 ft. 10 in.; ⅞-in., 2 ft. 4 in. Following is price per pound for ½-in. and larger, in 1200-ft. coils:

Boston	$0.33½	Birmingham	$0.39
New York	.36	Denver	.35½
Cincinnati	.33½	Kansas City	.34
Chicago	.34	Seattle	.34
St. Paul	.34	St. Louis	.33
San Francisco	.32	Los Angeles	.35

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

PIPE COVERING		BLOCKS AND SHEETS	
Pipe Size	Standard List Per Lin. Ft.	Thickness	Price per Sq. Ft.
1-in.	$0.27	½-in.	$0.27
2-in.	.36	1 -in.	.30
6-in.	.80	1½-in.	.45
4-in.	.60	2 -in.	.60
3-in.	.45	2½-in.	.75
8-in.	1.10	3 -in.	.90
10-in.	1.30	3½-in.	1.05

85% magnesia high pressure..... List

For low-pressure heating and return lines..... 4-ply..... 58% off; 3-ply..... 60% off; 2-ply..... 62% off

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw in barrel	$1.90	$1.26	$2.10	$1.30	$2.05	$1.20
5-gal. cans	2.00	1.36	2.25	1.40	2.25	1.30

* Nominal.

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red				White	
	Current		1 Year Ago		Current Dry and In Oil	1 Year Ago Dry and In Oil
	Dry	In Oil	Dry	In Oil		
100-lb. keg	14.00	14.50	13.25	13.50	14.00	13.00
25 and 50-lb. kegs	14.25	14.75	13.50	13.75	14.25	13.25
12½-lb. keg	14.50	15.00	13.75	14.00	14.50	13.50
5-lb. cans	.....	.....	15.25	15.50	16.00	15.50
1-lb. cans	.....	.....	.....	.. ..	17.00	.....

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Cincinnati	$13–16.75	Birmingham	$15.00
St. Louis	10.00	Denver	9.50

WIRING SUPPLIES—New York prices for tape and solder are as follows:

Friction tape, ⅙ lb. rolls	38c. per lb.
Rubber tape, ⅓-lb. rolls	45c. per lb.
Wire solder, 50-lb. pools	46c. per lb.
Soldering paste, 2-oz. cans	$1.20 per doz.

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco.

	1-Ply		2-Ply		3-Ply	
	C.l.	L. C.l.	C.l.	L.C.l.	C.l.	L.Cl.
No. 1 grade	$1.33	$1.60	$1.70	$1.95	$2.05	$2.30
No. 2 grade	1.20	1.15	1.50	1.75	1.80	2.05

Asbestos asphalt saturated felt (14 lb. per square) costs $5.35 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs per $2.20 roll in carload lots and $2.45 for smaller quantities.

Shingles, red and green slate finish cost $5.50 per square in carloads, $5.75 in smaller quantities, in Philadelphia.

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

	Carload Lots	Less than Carload Lots
Tarfelt (14 lb. per square of 100 sq. ft.)	$64.00	$65.00
Tar pitch (in 400-lb. bbl.)	21.00	22.00
Asphalt pitch (in barrels)	40.00	45.50
Asphalt felt	72.50	77.00

HOLLOW TILE—The price per 1000 in carload lots f.o.b. mine is as follows:

	4 x 12 x 12	8 x 12 x 12
St. Louis	$70.00	$140.00
Chicago	70.00	120.00
Denver, per ton	None	None
Kansas City	78.60	150.00
St. Paul	56.00	110.00
Boston	110.00	150.00
Birmingham	72.00	135.00
Cincinnati	72.75	136.10

LUMBER—Price of yellow pine per M in carload lots:

	1-in. Rough 10 In. x 16 Ft.	2-In. T. and G. 10 In. x 16 Ft.	8 x 8 In. x 20 Ft.
St. Louis	$21—37.05	$23.00—24.50	$26.00
Birmingham	33.00	33.00	28.50
Denver	40.00	42.00	42.50
Cincinnati	45.00	44.00	39.00

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill, in Carloads	New York Current	New York One Month Ago	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
*No. 28 black	5.00	6.495	6.445	10.00	6.42	9.50	6.52	9.50
*No. 26 black	4.90	6.395	6.345	9.90	6.32	9.40	6.42	9.40
*Nos. 22 and 24 black	4.85	6.345	6.295	9.85	6.27	9.35	6.37	9.35
Nos. 18 and 20 black	4.80	6.295	6.245	9.80	6.22	9.30	6.32	9.30
No. 16 blue annealed	4.45	5.695	5.645	9.70	5.62	9.70	5.72	9.70
No. 14 blue annealed	4.35	5.595	5.545	9.60	5.52	9.60	5.62	9.60
No. 10 blue annealed	4.25	5.495	5.445	9.50	5.42	9.50	5.52	9.50
*No. 28 galvanized	6.25	7.745	7.695	13.00	7.67	11.00	7.77	11.00
*No. 26 galvanized	5.95	7.445	7.395	12.70	7.37	10.70	7.32	10.70
No. 24 galvanized	5.80	7.295	7.245	12.55	7.22	10.55	7.47	10.55

* For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 5c., all gages

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities:

	Denver			St. Louis			Birmingham		
No.	Single Braid	Double Braid	Duplex	Single Braid	Double Braid	Duplex	Single Braid	Double Braid	Duplex
14	$15.00	$20.00	$35.00	$12.50	$15.50	$33.50	$11.50	$17.80	$36.80
10	25.65	28.90	57.45	27.20	31.00	63.00	31.80	34.30	67.60
8	36.45	40.25	80.30	38.00	42.00	78.00	42.85	46.85	.....
6	57.40	61.70	.....	.....	65.00	130.00	69.60	74.10	.....
4	83.40	88.70	.....	.....	93.00	.....	101.75	151.35	.....
2	126.60	132.80	.....	.....	140.00	.....	151.50	168.00	.....
1	164.15	172.40	.....	.....	182.00	.....	201.00	254.50	.....
0	206.80	206.80	.....	.....	242.00	.....	276.00	285.00	.....
00	278.80	278.80	.....	.....	290.00	.....	317.00	330.00	.....
000	341.65	341.65	.....	.....	360.00	.....	417.00	428.50	.....
0000	417.05	417.05	.....	.....	435.00	.....	508.00	516.04	.....

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25-lb. keg for black powder:

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	Gelatin 80%	Black Powder
New York	.....	$0.28½	$0.35½	.....	$2.50
Boston	$0.25½	.28½	.35½	$0.42½	2.50
Cincinnati	.19½	.23½	.29½	.....	2.45
Kansas City	.21½	.27½	.34½	.44½	2.55
Seattle	.15½	.22½	.39½	.....	2.35
Chicago	.19½	.23½	.34	.44	2.45
St. Paul	.20	.27½	.34½	.....	2.45
St. Louis	.20	.27½	.34½	.44½	2.35
Denver	.18½	.26	.33	.43	2.55
Dallas	.24	.31½	.38½	.48½	.....
Los Angeles	.23	.29	.37	.....	3.05
San Francisco	.19	.26	.33½	.43½	2.35

* Price for 100 tons or over

FREIGHT RATES—On finished steel products in the Pittsburgh district including plates, structural shapes, merchant steel, bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc., the following freight rates per 100 lb. are effective:

Boston	$0.27	New Orleans	$0.385
Buffalo	.17	New York	.245
Chicago	.27	Philadelphia	.23
Cincinnati	.23	St. Louis	.34
Cleveland	.17	St. Paul	.495
Denver	.99	Pacific Coast (all rail)	1.25
Kansas City	.59		

Note—Add 3% transportation tax.